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JOHN F. DASHIELL
UNIVERSITY OF NORTH CAROLINA

Some Conditions of Suggestion and Suggestibility: A Study of Certain Attitudinal and Situational Factors Influencing the Process of Suggestion

By
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HOFSTRA COLLEGE
HEMPSTEAD, LONG ISLAND

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THE writer wishes to express his appreciation to Professor Hadley Cantril, under whose supervision the present study has been carried out. The extent of the writer's indebtedness will be evident upon comparison of the present conceptualizations with those presented in Professor Cantril's forthcoming volume *The Psychology of Social Movements*. Professor Daniel Katz has given invaluable assistance and constructive criticism throughout the entire effort. The writer also wishes to thank Professors E. G. Wever and C. W. Bray for their assistance in designing and constructing the apparatus described in Chapter VI.

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FOREWORD

By Hadley Cantril

Princeton University

IT would be difficult to think of a more appropriate subject for a systematic psychological monograph today than the topic of "Suggestion." The subject is particularly timely for two reasons. The utilization of suggestion in the psychological warfare now in process has increased general interest in the concept. Furthermore, in the present state of the development of social psychology, there are few subjects more important for a mature formulation of theory.

Since the days of LeBon and E. A. Ross, the problem of suggestion as one for systematic consideration has somewhat dropped into the background for social psychologists. They seem to have been content mainly to deal with suggestion as a phenomenon to be accepted rather than explained. The bulk of experimental research on the subject seems to have been designed to demonstrate that suggestion exists, or to determine certain "conditions of suggestibility" by seeking correlations. Both of these approaches have been invaluable but both have tended to obscure the more fundamental problem of understanding just what the psychological condition we call "suggestibility" is in the life of normal people.

Dr. Coffin has attempted to bring together some of the loose experimental threads and has tested some of his own systematic formulations with experiments, some of which are extremely ingenious. Certainly, Dr. Coffin would be the last to say that his description of suggestion is even near the final explanation of this phenomenenon, but I do believe he can make definite claim to have advanced our thinking on the problem and to have shown us where some of the most important future research areas lie.

INTRODUCTION

IT is generally agreed that there exists a type of response to stimulation which may be termed "suggestion." The tendency to make such response is called "suggestibility." Widely varying definitions of this phenomenon have been proposed, and experimentation on the phenomenon has been perhaps equally varied in regard to choice of stimuli and responses measured. The term suggestion seems to be applied in three general behavior-settings: it is used in abnormal psychology, to describe responses found in certain conditions such as hysteria and hypnosis; it is used in social psychology as a concept to explain in part the process of acquisition or change of attitudes or the influence of propaganda; and it is used in experimental "laboratory" psychology in ways which seem to be outgrowths of, or efforts to measure, the first two conceptions.

Through all these varieties of definition and experimentation, however, there seems to run a thread of agreement as to the type of response implied by "suggestion." The response is usually considered an "uncritical" or "unreasoned" response (and is by implication set against a "critical" or "reasoned" response process, which is considered "thought"). The definitions imposed usually imply some sort of "uncritical" acceptance of a proposition or course of action and the observer or experimenter usually notes or sets up a situation offering possibilities of "right" or "appropriate" responses and of "wrong" or "inappropriate" responses, together with a "proposition" to the subject that he make the "inappropriate" response. If he does so, the observer considers this "suggestion"; if he makes the "right" response, it is considered "non-suggestibility," or "thought" or "critical response." In the laboratory, the subject is required to make a judgment on the characteristics of some stimulus, is plied with "suggestions" proposing that he judge in a particular fashion (usually the "wrong" way), and then scored according to the extent to which his responses assume the direction indicated by the suggestions. If he judges "incorrectly" to the satisfaction of the experimenter, he is termed suggestible. If he persists in judging correctly, he is classed as unsuggestible, negatively suggestible, or critical or thoughtful.

This much seems to be generally agreed as to the phenomenon of suggestion. Definitions and theories differ as to *how* the suggested proposition

takes effect, and commonly fail to offer descriptions of the situations in which suggestion may be expected *not* to be effective.

An adequate description of the conditions of suggestion should include the conditions resulting in suggestion and the conditions which will fail to result in suggestion. It is evident in the light of our present knowledge that the acceptance of suggestion is no unqualifiable prediction. Some suggestions are accepted and acted upon, others are not. The problem thus becomes: under what conditions are suggestions accepted and under what conditions are they not? Suggestion *qua* suggestion is no inevitable phenomenon. The search thus becomes one for additional conditions of suggestibility and non-suggestibility. This search is the object of the present investigation. Can such conditions be described, and is it possible to subsume under a few general principles the varieties of theory and experimental results, in terms which might be said to describe the "conditions of suggestion"?

Let us examine first the history of the problem, review its experimental literature and summarize its present status. This will provide a comprehensive basis for a statement of our problem and hypotheses.

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CHAPTER I

HISTORY

Early History of Suggestion

ANGELL remarks that "Suggestion has been more or less unintelligently used as far back as we have historical evidence."[1] The general course of this usage, the historical development of theories and conceptions of suggestion are rather interesting. Briefly: it seems that the present psychological problems of suggestion have their beginnings in two sources: early abnormal psychology and early sociology. The principle of suggestion seems to have come from the hypnotists of the latter half of the nineteenth century (resurrected, though, from its earlier discovery in the seventeenth century),[2] to have been taken from them by the early sociologists of that period, and from these two schools of thought it has been taken up into experimental social psychology.

The early origins of interest in suggestive phenomena derive from Philippus Aureolus Theophrastus Bombastus Paracelsus von Hohenheim (1493–1541) who propounded a theory of the influence of the stars on human health.[3] Van Helmont (1577–1683) was influenced by Paracelsus in producing his doctrine of animal magnetism, and Greatrakes (1629–83), taking this up, produced remarkable cures on this basis. Mesmer is the next well-known name in the series, but he was actually preceded by a group of men who are apparently the true pioneers in the understanding of hypnotic phenomena and suggestion. Malebranche, Maine de Beran, de Beauchène and Demangeon, in the seventeenth century, described hypnotic phenomena and showed how they could be explained in terms of the general laws of thought.

Mesmer, about 1780, recalled the doctrine of animal magnetism. He had

[1] Cited in Olkon (96, *p. 858*).

[2] Janet has given us a highly interesting account of much of the early work on suggestion as it has been applied particularly to problems of "psychological healing" (66, especially Chapter IV). It is to his treatment, as well as to the briefer discussion of Hull (60), that we are indebted for much of the material in the present brief survey. Bramwell (23) also brings together much of the early work on the topic.

[3] Interest in the problem of hypnosis can of course be traced into antiquity (cf. 40). An Egyptian papyrus dating about 3000 B.C. sets forth the procedure of modern hypnotism. The Medes, the Chaldeans and the peoples of Asiatic India seem to have been very familiar with the hypnotic state. Early interest resided especially in the application of hypnosis to temple rites and rituals of various religions. Probably from such sources and from later Greeks and Romans the practice spread throughout Europe and was seized upon by those men who are more nearly in the direct line of descent of our present interests.

great popular success with his *baquets* but though his phenomena were reproducible his theories were ill-conceived and were thrown into disrepute by two commissions which sat upon and discredited him with the fashionables of the day. One of these commissions, in 1784, came to the heart of the matter when they declared that Mesmer's "phenomena were due to the influence of the magnetist himself," rather than to "animal magnetism."

The early nineteenth century finds the birth of the actual theory of suggestion. Noizet, whose book, though not published till 1854, was drafted in 1820, pointed out that the fundamental psychological law at work here is the law in accord with which every idea tends to become an action; the suggested action is performed because the idea of the action has made its way into the subject's consciousness. (Compare this interpretation with James' principle of ideo-motor action.) These ideas on hypnotism were expanded by Alexander Bertrand, friend of Noizet, who insisted that the facts could be explained on scientific, deterministic and psychological lines, by adequate study of the mental condition of the subjects. Actual parentage of the theory of suggestion in hypnosis, according to Janet, should be credited to Bertrand.[4]

Hypnotic problems still of interest were studied by several men during the period around 1825.[5] Janet remarks:

"Generally speaking, scant justice is done to many of these authors. Durand de Gros waxes indignant at the way in which, a few years ago [he is writing in 1860], those who were studying suggestion believed themselves to be making pioneer experiments when they were merely repeating those that had been made long before. Durand adds: 'All that our modern contemporary suggestors can offer in the way of observation and experiment, was furnished, with a wealth of detail, in an American treatise, of which the first edition was published in 1851. I refer to *The Philosophy of Electrical Psychology,* by John Bovee Dods.'" (66, *p. 155.*)

Janet continues:

"Other writers are prone to refer to James Braid of Manchester, whose first publications on the subject date from 1841, as the most notable forerunner in the fields of hypnotism and suggestion. . . . It is probable that Braid was the introducer of the term suggestion, but . . . Braid's works contain no essentially new facts. All the phenomena observed by him had

[4] Thus Janet describes the genesis of the theory of suggestion (1823): "Bertrand develops the general view that the psychological phenomena observed during the magnetic state are not exceptional phenomena, but are normal, or at least phenomena which can be observed under other conditions. Artificial somnambulism, said Bertrand, serves merely to render conspicuous and to amplify phenomena dependent upon the working of the general laws of imagination, expectant attention, and desire. If normal psychology could give a satisfactory explanation of these phenomena, the same explanation would be applicable to all that is witnessed in somnambulistic patients." (66, *p. 157.*)

[5] Deleuze (1813 through 1825), Abbé Faria (1825) and Delatour studied suggested amnesia and anesthesia and post-hypnotic suggestions. Charles Despine, a student of Bertrand, and Teste, renewed accounts of such phenomena in 1840. Charpignon (1842–48) studied the duration of suggested hallucinations and the physiological changes possible of production by suggestion, and his work was repeated by Dupotet in 1849. Perrier of Caen (1849–54) studied hallucinations and contractures.

already been admirably described in the writings of Puységur, Bertrand, Deleuze and Charpignon. It is, indeed, very interesting to note that the fundamental facts were ascertained at a very early stage, and that no important discoveries were made in the sequel. . . . Has a more notable advance been made in the interpretation of the facts?" (66, *pp. 155–156.*)

To this general period belong also Liébault, whose work reproduces that of Noizet, and Durand de Gros, Mesnet, and Moreau de Tours, all of whom noted the influence on behavior of not only verbal suggestion but the suggestive effect of objects in the environment. Then in the late 1850's and 60's came a sharp decline in interest in hypnotism and suggestion, due probably to the discovery of ether (1846) and chloroform (1847) as easier and more trustworthy anesthetics. "By 1865 suggestion and hypnotism seemed as dead as animal magnetism," says Janet. And for twenty years they were abandoned nearly completely to charlatans.

The rebirth of hypnotism came with the work of the two schools for which hypnosis is probably most famous, the Salpêtrière school and the Nancy school. These were actually preceded by the work of Charles Richet (between 1875 and 1883), who again described all the phenomena of suggestion, but his work was eclipsed by the Salpêtrière-Nancy controversy. The Salpêtrière school was led by the famous Charcot, and again gave scientific status to hypnosis by the cautious, meticulously scientific approach of Charcot, an approach based on his well-established neurological techniques and calculated to guarantee the scientific accuracy of his findings.

Unfortunately for the workers at the Salpêtrière, and perhaps also for hypnosis, what were good neurological techniques were not in this case good psychological techniques, with the result that Charcot was led into a pitfall. His conclusion that hypnosis was a disease-phenomenon of hysteria was promptly challenged by the workers at Nancy. Bernheim and Liébault (following the interpretation of Noizet, as transmitted by Bertrand and Faria) showed conclusively that it was normal and psychological ("There is no hypnosis; there is only suggestion"). The contretemps was unfortunate not only for Charcot but for hypnosis, because his approach had at least given the blessing of official science to the study of the problem. Under the criticisms of the Nancy school, these methods were discredited and the problem made so commonplace ("Everything is suggestion") that science soon lost interest again. Hypnosis was once more abandoned to the stage and the faith-healers until such men as Hull and his students worked out new experimental procedures and methods of recording and revived our hopes of a scientific approach.

But the importance of suggestion for social psychology begins precisely here, where its importance for abnormal psychology diminished for the time. We may almost say that the actual beginnings of experimental social psychology itself are grounded in the problem of suggestion.[6]

[6] Murphy and Murphy state, "The actual beginning of *experimental social psychology* seems to have been the experimental study of suggestion. . . ." (93, *p. 5,* italics in the original.)

Murphy says of social psychology, "The exploration of this field commenced with the attempt to show the laws by which groups control the conduct of their members and how individuals within the group act upon one another. As a separate discipline, social psychology began in the writings of Tarde, Sighele and Le Bon" (92, *p. 290*).

These early sociologists, seeking explanation for group activities, were attracted by the furious interest of the doctors in phenomena of the interaction of individuals in the process of suggestion and hypnotism. "Much clinical material was available to show how the individual could be reduced to an automaton by suggestions imposed upon him" (92, *p. 290*). Sighele, Le Bon and Tarde perceived the significance, to their problems, of the phenomena of suggestion and the related principles of imitation and sympathy.

Le Bon (74) applied these concepts to historical material, especially the French Revolution. He conceived group suggestibility as the key to mass-movements. His work, while emphasizing the descriptive rather than the analytical, influenced Tarde, who produced a logical analysis of the forms of social interaction according to "the laws of imitation." "Tarde's pages are full of material which seems to belong to suggestibility, as Liébault defined it. . . ." (92, *p. 291*). "He borrowed freely from French psychiatrists and viewed imitation as closely connected with suggestibility" (18, *p. 9*).

Tarde's book, "The Laws of Imitation," played a directing part in the thought of American sociologists. Ross was influenced by Tarde to devote much attention to the various categories of imitation. He applied the principles of imitation and suggestion to current social phenomena (105), and advanced Tarde's usage by a more critical application of the concept of suggestion, with special emphasis on suggestion by verbal and facial expression.

Ross' treatment drew also upon the work of Sidis (124). Murphy characterizes Ross' "law of crazes" as an "ingenious attempt to formulate the laws of group suggestibility" (92, *p. 293*). His conceptions of the relation of suggestibility in "crazes" to the concurrent condition of the culture may even today suggest interesting hypotheses for experimental attack: "The higher the craze, the sharper the reaction from it. . . . A dynamic society is more craze-ridden than one moving along the ruts of custom."

McDougall's very important book of the same year (83), the first to receive the title "Social Psychology," devoted attention to the problems of suggestion, imitation and sympathy, and many of the present concepts and

definitions of suggestion derive from his classic definition of suggestion as "the acceptance of a proposition in the absence of logically adequate grounds."

Much of the early experimental work in social psychology may be traced to the influence of these men and their conceptions of social interaction. It is appropriate to turn therefore from these largely theoretical or clinical descriptions of suggestion to a consideration of the experimental work on the problem of suggestion.

Recent Experimental Work

The transition from the nineteenth to the twentieth century marks also in rough fashion a transition in the history of suggestion. This period might serve as a broad boundary between what could be called the historical phase and the modern phase in the study of suggestion.

The works of the earlier period group themselves into a general class marked by certain similarities: the interest in suggestion was directed particularly toward those manifestations of the phenomena first termed animal magnetism, later termed hypnosis. The problem itself was considered rather bizarre, if not actually taboo. The investigations were in the hands of practicing physicians rather than laboratory scientists (until Charcot). The "experiments" themselves partook more of a demonstrational nature than experimental as we now understand the technique. The method was what we should now call clinical rather than experimental. The results were treated in an observational rather than a statistical fashion.

With the later work of Charcot's pupils, notably Binet, we find the emergence of the more modern picture of suggestion-experiment.[7] With these workers, suggestion assumed a place as a legitimate problem of psychology (for Binet, one closely related to intelligence) and of normal, experimental psychology at that. Suggestion itself became the problem: normal, waking suggestion, rather than hypnotic hysteria. Experimental psychologists became the investigators, men of psychological and scientific rather than of medical and therapeutic interests and training. Standard laboratory techniques were employed, larger groups of *normal* and *waking* subjects were used, and the results were designed to be susceptible of quantitative treatment.

General historical treatments, reviews and summaries.

Janet (66) presents an excellent review of the early historical period. Bramwell (23) and Hull (60) have also surveyed the rise of hypnotism. Pertaining more directly to suggestion *per se*, Scott (109, 110, 111, 112, 113,

[7] The actual experimental investigation of "normal" suggestion probably begins with Ochorowicz, in 1887. His work, however, is still "saturated with the 'mysterious' and the occult" and is "little more than a bibliographical curiosity" (151).

114, 115) has reviewed articles year by year in the *Psychological Bulletin,* from 1910 to 1916. Otis (97) gives an inclusive discussion of earlier "tests" of suggestibility. Young's review of the literature on hypnotism and suggestion (158), is quite extensive. Simmons (125) briefly summarizes (in chronological order) the conclusions of many investigations, emphasizing the results pertaining to tests of suggestibility. Of the "textbook" discussions, probably those of Murphy and Murphy (93) and of Bird (18) are most extensive and detailed. Bird has also published a recent bibliography of (English) titles in suggestion (17), exclusive of hypnosis (with the unfortunate omission of several rather important references).

Organization of the experimental review.

If experimentation on suggestion is viewed in its historical sequence there seems a tendency toward investigation of increasingly complex examples of suggestion with passing time. Earlier experiments were predominantly concerned with sensory-motor processes (though Binet early introduced experiments on simple "prestige" suggestion). Interest gradually shifted to verbal-motor processes, then began to point toward suggestion involving more complex set or attitudes. At about the same time, there began to appear investigations of such broader aspects of prestige suggestion as those concerning the influence of majority and expert opinion. As newer statistical tools have found their way into the hands of experimenters, investigations of all types have evidenced increasingly complex quantitative treatment of results. With the growth of interest in mental tests, more elaborate suggestion tests were evolved. The interest in personality and its traits stimulated investigation of a consistent "trait of suggestibility" and its personality correlates. The relationship between suggestion and hypnotism has again come to the fore in the many studies inspired by Hull. Finally, as social psychology has expanded and invaded broader realms of social relationships, investigation of suggestion has been extended to the fields of stereotypes, attitudes and propaganda.

An interesting demonstration of the gradual shift of interest toward more complex types of suggestion is found if we plot the frequencies of various types of investigation against their dates. As a sample, we have made such a graph (p. 7) from the review of suggestion given by Murphy and Murphy (93). While this of course represents an arbitrary selection of data, their review is one of the more complete treatments of the literature to 1930 and they have presumably selected representative experiments for discussion. These simple graphs are offered here merely for purposes of illustration. The data are drawn from the references cited by Murphy and Murphy and are grouped according to their own classification of the experiments. The distributions indicate a gradual shift in "central tendency," from simpler

to more complex types of suggestion as we pass from earlier to more recent periods.

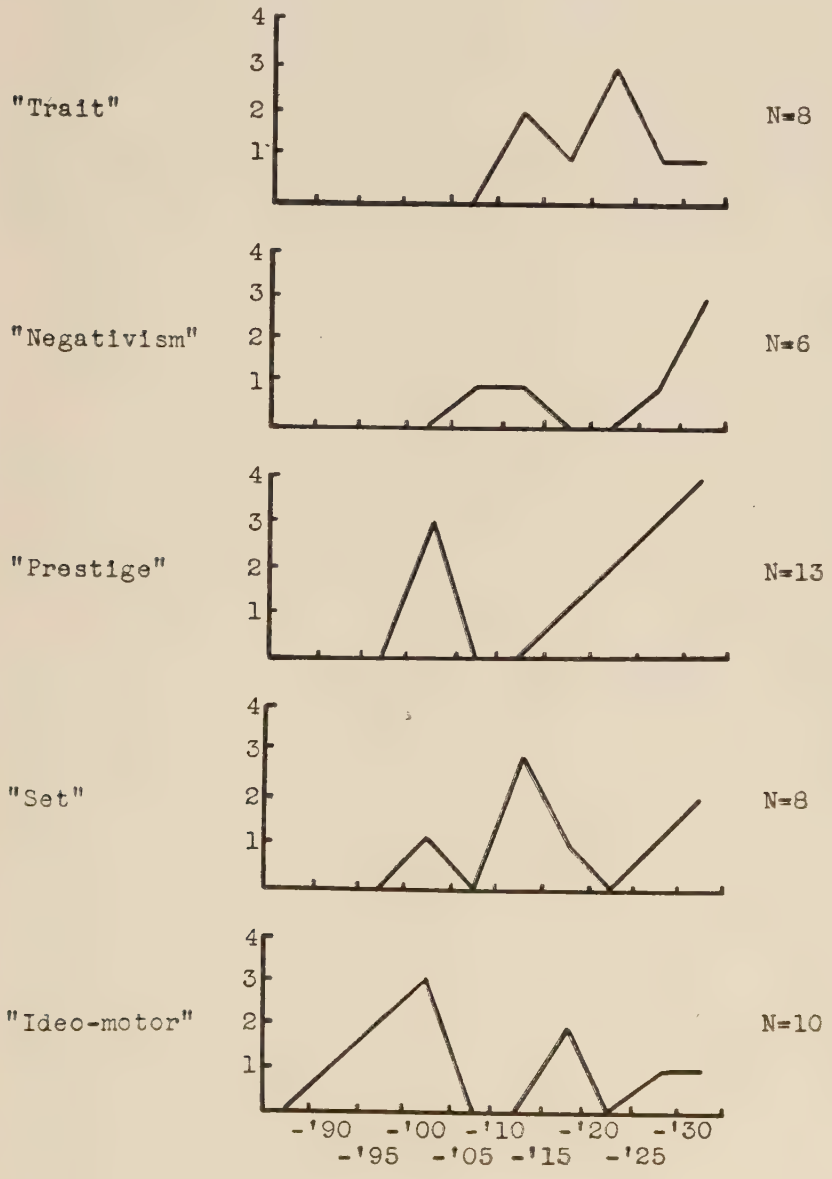

Fig. 1. Investigations of Suggestion
Showing shift of interest in "types" of suggestion investigated. Compiled from references cited by Murphy and Murphy (93), grouped according to their classification. Five-year intervals. Total N=45.

The "modal points" of the various types would appear to advance approximately by decades:

Ideomotor	1898
Set	1908
Trait	1918
Prestige[8]	1928
Negativism	

For purposes of classification and historical perspective, then, we have adopted a similar arrangement in reviewing suggestion experiments.[9] The broad divisions have been made in terms of "ideomotor suggestion," "prestige suggestion" and the investigation of "suggestibility as a character trait."

I. IDEOMOTOR SUGGESTION.

A. *Sensory-motor suggestion.*

1. *Suggestion by sensory perseveration or simple repetition of a previous response.* The most simple demonstrations of suggestion are seen in those experiments which capitalize on the tendency to make a response which has previously been made in a similar situation. These responses comprise a large part of what has frequently been termed 'gullibility,' or susceptibility to illusions.[10]

Among the many demonstrations of this level of suggestibility are the experiments of Brown (26). In the "electric shock illusion," the subject holds in his hands the electrodes from the secondary coil of an inductorium, while the secondary is pushed closer and closer to the primary, until a shock is reported. Then the current is secretly turned off, and the process carefully repeated. Of 158 men and women tested, three-fourths felt a shock the second time, when there was no current. Another clever suggestion was made with the observation of motion. A spot of light is thrown on the wall of a darkened room and the subjects told to report when they see it move. A rather noisy crank is turned and the spot goes up or down,

[8] N.B., the three prestige references in 1900 are to Binet's investigations of the simpler "personal" prestige of the experimenter. Not included here by Murphy and Murphy are the more recent experiments on stereotypes, attitudes and propaganda.

[9] It must be recognized that such classification is necessarily somewhat arbitrary. We have simply attempted to group experiments according to outstanding similarities of purpose or procedure. The differentiae are not precise, and it often depends largely upon what aspect of a given experiment is emphasized, as to the classification made of it. The present classification represents a modification of that proposed by Murphy and Murphy.

[10] The field of perceptual illusions has been especially fruitful of suggestion-experiments. The most popular illusions for such work have been the size-weight illusion (26, 84, 117); illusory warmth (47, 57, 78, 116, 127, 128); illusion of smell (65, 87, 96, 117, 127, 128). Other illusions employed have been: illusion of localization (78); illusion of moving light (1); illusion of pain (127); illusion of taste (117).

so that every one sees it move. Then the process is repeated, but though the crank noisily grinds away the spot is stationary. Ninety per cent of a large group of college students reported that it moved.[11]

Binet's progressive line test (16) is of this character also. The subjects are shown successive lines and asked to reproduce them. The length of the lines increases steadily up to the fifth line, but from then on they are the same. Almost all of the subjects, however, keep on increasing the length of their reproductions until about the twentieth line, some more than doubling the actual length.

2. *Suggestion by sensory set or expectancy induced by non-verbal stimuli.* A study by Valentine and Gorsuch (140) provides a "transition experiment" between "perseveration" and "set." They attempted to influence perception of the binaural shift by suggestive "set." Before observing the binaural beat, subjects were required to count the monaural beat, a "technique designed to suggest the 'beat character' of the binaural presentation. . . . All of the subjects reported the binaural phenomena as a beat."

The size-weight experiment of Gilbert (48) and others is similar. Children tend to estimate weight from size, large objects as heavy, small objects light. As the Murphys say (93), this is a suggestion effect based upon expectation, and is of course free from the social factor as far as the experimental situation itself is concerned. Hollingworth (58) has demonstrated that susceptibility to this sort of suggestion increases throughout the course of the day, a fact which he relates to increasing drowsiness producing increased dissociation.[12]

Edwards (41) attempted to get at the conscious aspects of the acceptance of a suggestion. Using many kinds of sensory stimuli (such as color, noise, temperature and smell), he found that in many cases suggestion did appear to touch off motor reactions directly, without sensory consciousness, though in other cases the suggestion appeared to arouse conscious sensory experience.

B. *Verbal-motor suggestion.*

1. *Relatively simple conditioned "non-symbolic" responses to verbal*

[11] One of the common classroom demonstrations of suggestion is for the professor to insert with other class demonstrations of sensory acuity a test of "olfactory acuity," in which he carefully pours various liquids over a wad of cotton on the desk and times "the interval required for the substance to diffuse to the various parts of the room," the students holding up their hands as soon as they smell the odor. The particularly interesting part is that all the bottles simply contain water. Seventy-five per cent of Ross' college students smelled the odor within one minute (105).

[12] Since the bulk of research has employed school children or college students as subjects, Stevick's investigation (135) of suggestibility in adults is instructive in rounding out our information with a less restricted population. Using a "representative sample" of 187 men and women, he found "only about 20%" register more than one point-score in suggestibility on Binet's progressive weights test.

stimuli. In an experiment by Jones (68), the subject was to place two pegs as far apart as two shown him by the experimenter. The suggestions employed were auditory, visual and auto-suggestions to the effect that the subject was or was not able to do the task. The reactions corresponded in considerable degree to the suggestion given, and the auditory and negative suggestions were found most effective.[13] Bell's experiment (15) demonstrates the close relation between sensory set and verbal set. He found that auditory and visual suggestion affected the reproduction of triangles, but thought that he could differentiate the effect of verbal from sensory suggestion. With practice, subjects come to disregard the verbal stimuli and to respond primarily to "sensory suggestions."

The influence of suggestion on dynamometer performance is shown by Manzer (81). Suggestions that the load was "easy" or "medium" caused a reduction in output of 7.24 per cent and 4.82 per cent respectively. The suggestion, "hard," caused an increase of 4.66 per cent in work done. In an attempt to determine the extent to which the attitude of the subject may affect the results of a distraction experiment, Baker (6) gave groups of subjects three types of suggestion regarding the effects of the extraneous stimuli which were to be introduced. The suggestions were presented in the form of fictitious graphs 'representing the results of some previous experiments.' In general, the variations of the resulting output corresponded to the various suggested "attitudes or sets."[14]

2. *More complex responses, with a strong element of "expectation."* A great many of the tricks of the magician depend upon the arousal of an attitude of expectancy, as an 'atmosphere effect' reinforced by the magician's "patter," whereby the audience *sees* happen what it has been led to expect *will* happen. In his study of the suggestibility of children, Small (128) had a toy camel arranged with a rope around its neck in such a way that when he turned a windlass the suggestion was given that he was pulling the camel, though the latter did not move. Influenced by the suggestion, 291 out of 381 pupils asserted that they saw the camel move. In this experiment the mechanism of the windlass and the force of its pull were carefully explained beforehand and a high degree of expectation

[13] Binet and Vaschide (16) got 77 out of 86 children to reproduce a four centimeter line as longer than a five centimeter line, by showing the five centimeter line first and telling the children that the second line would be longer than the first.

[14] Baker also employed groups subjected to difference in the method of motivation. "The comparison of a subject's performance with that of other members of an experimental group is a more efficient motivating device than information regarding that subject's performance alone." Translating these results into other terms, it would seem that in this situation such a factor as 'influence of the group' is more effective than 'knowledge of results.'

aroused, so that the asserted perception of movement was the result of the "vivid idea."

A number of experiments have indicated the effectiveness of suggestion in influencing the reproduction of visually perceived forms. Woodworth (153) notes that the importance of "'set' is well brought out in an experiment in which the experimenter's naming of an ambiguous figure just before the exposure had a tendency to steer perception and immediate reproduction in the direction suggested"(33). Hanawalt and Demarest (54) have investigated the problem of verbal suggestion introduced during recall rather than during immediate perception of figures. One of their interesting findings is that the effect of the suggestion increases with delay of the recall.[15]

Finally, some of the best demonstrations of ideo-motor suggestion have come from Hull's laboratory at Wisconsin (63). Much of his work has been done using postural reactions as the criterion of suggestion. A thread is fastened to the collar of the subject without his knowledge. This leads to the needle of a kymograph recorder, which records his movement as he sways forward or backward while standing. By giving verbal or visual suggestion, or auto-suggestion, the subject can be made to change his posture. A few seconds after the experimenter starts to repeat "You are falling forward, you are falling forward," the subject does actually sway forward as much as 8 or 9 inches.[16]

3. *Verbal suggestions which touch off an attitude or set.* Slightly more complex perhaps, is the suggestion which touches off an attitude or set. There seems to be no hard and fast distinction of this type from the sensory-motor, save in the fact that the results of sensory-motor action tend to be what Hull would call "non-symbolic," while the acts resultant from the arousal of an attitude or set are often symbolic, such as verbal responses, or if non-symbolic, the response to the suggestion may be of a delayed character.

[15] Hanawalt and Demarest developed a very nice method which permitted more objective measurement of the effect of suggestion. "For some of the figures there are characteristic changes which can be counted, measured, etc." For example, the first figure was shaped much like a diamond in a rectangle. For this figure, one group received the suggestion "Draw the figure which resembled 'a diamond in a rectangle.'" To the other group the suggestion was ". . . 'curtains in a window.'" "The suggestion of 'diamond in a rectangle' tends to bring the inside lines together at the bottom of the figure, whereas the suggestion 'curtains in a window' tends to keep them separated in reproduction." By simply counting the reproductions which 'close' the lines in comparison with those which leave them 'open,' the experimenters obtain an objective measure of the effects of suggestion. This technique offers an ingenious solution of the frequently difficult problem of measuring differences which seem more qualitative than quantifiable.

[16] Dr. Frederickson has communicated an interesting observation on suggestions of postural sway. He found in precept demonstrations that the suggestion is not effective *unless the subjects are prepared* by telling them, "If you feel yourself falling, don't try to prevent it."

Myers (95) produced practical results with this sort of suggestion, in educating foreign soldiers in the army. Letter writing was taught by model letters. These contained opinions and facts thought desirable for the soldiers' mental equipment. It was found that the content as well as the form of the models was accepted by the recruits.

Powelson and Washburn (99) asked 35 students to judge the series of Bradley color papers on the basis of their pleasantness and unpleasantness, and later presented the same papers accompanied by descriptive phrases such as "faded," "delicate," "crude," or "warm." Twenty-five of the subjects changed their judgments in conformity with these suggestions.

Farnsworth and Beaumont (43) found they could influence students' judgments of paintings by attaching to the pictures descriptive paragraphs praising or criticizing the work. In all cases the pictures accompanied by a favorable paragraph were ranked higher than those with unfavorable paragraphs. Sisson (126) confirms the findings of Farnsworth and Beaumont; he also compares the potency of two forms of suggestion: direct verbal suggestion by the experimenter, and indirect symbolic suggestion conveyed by a checkmark. Both forms of suggestion are effective, though the symbolic cue is less influential than direct verbal suggestion. Sisson makes the interesting observation that the symbolic cue (checkmark) "is somewhat comparable to the use of the trademark in commercial propaganda."

Langfeld, Fernberger, Jarden and Sherman have shown that judging facial expressions without knowing the setting is largely a matter of chance, but that if a suggestion is introduced, whether it be true or false, it brings a consistency of choice concordant with the suggestion given.

Langfeld (73) employed 105 "modified photographs of a talented actor," comprising "facial expressions for a wide range of emotions and moods." The subject was shown the picture and asked to write down his judgment of the expression. After he had done this he was told either the artist's title or an incorrect title and asked whether he agreed with this title. "Of the total number of titles approved, 41 per cent offered opportunity for suggestion." Furthermore, only 32 per cent of the original judgments approximated the correct (artist's) title, but upon presentation of the "correct" suggestion, 73 per cent of the artist's titles were approved.[17]

Jarden and Fernberger (67) employed differing "degrees of suggestion" in studying the effect of suggestion on judgments of expression with the

[17] Dr. Langfeld does not, in his discussion of the results, refer to this figure, 73 per cent total correct titles approved, as an evidence of suggestion. However, the procedure seems to be somewhat similar to that of Jarden and Fernberger's later experiment in which they treat the effect of "naming" the correct title as "suggestion." We have taken the liberty of applying their terminology to Langfeld's results.

Piderit faces. Two degrees of suggestion were used, (1) mere "naming" of the 'represented' expression, and (2) "analysis" of the expression by one of the authors. Their conclusions were: suggestion increases to a considerable degree the percentage of correct recognitions of the faces. In the cases of the faces which do not give a high percentage of recognitions when no suggestion is given, "the amount of increase is progressive with increasing degrees of suggestion." For those faces which without suggestion give a relatively high percentage of correct recognitions, the further suggestion given by the analysis does not improve the percentages of correct recognition.[18]

II. PRESTIGE SUGGESTION.

A second general classification of the experimental work on suggestion is based on the emotional aspect of suggestibility. "A suggestion may, for instance, be accepted because of social motives, such as dependence upon, fear of, or fondness for some person" (93, *p. 135*). This type we should call *prestige* suggestion. Or the subject may react negatively, refusing to accept the suggestion, and often doing exactly the opposite of what is suggested, in which case we have *negative* or contrary suggestibility.

A. *Prestige by personal influence.*

1. Much of the work on prestige suggestion may be divided into two classes, according to the degree of complexity of the prestige employed. The first group of experiments is concerned primarily with the effect of 'personal influence of the operator.'[19] A large portion of the work of the Binet school is devoted to this type of suggestion. Giroud, for example (16), worked with 34 children on the progressive lines and progressive weights test, using suggestion by personal influence. The subjects made their lines and weights increase in size through the complete series, though the actual increase ceased with the fifth presentation.

Aveling and Hargreaves (5), and later Estabrooks (42), have given us the best experiments to distinguish the simple ideomotor type of suggestibility from that which results from emotional factors in a social situation.

[18] In the experiment of Jarden and Fernberger, the suggestions given were the *correct* expressions. Fernberger (46) then investigated the possibilities of "false suggestion" by suggesting *incorrect* expressions. The results indicate that false suggestion yields a great increase in the percentages of judgments according with the suggestion, as compared with accordant judgments made under conditions of no suggestion, and that the higher degree of suggestion, "analysis," increased still farther the acceptance of false names.

[19] Murphy and Murphy (93) have reviewed many of these experiments at some length, and have pointed out the relationship of this type of suggestion to the 'ideomotor' type. Consequently their discussions will not be duplicated here. Their discussion and interpretation of the work of Binet's school and of Aveling and Hargreaves and Estabrooks should be consulted for more complete details.

Their results yield a very interesting fact, namely that the suggestibility curves for the prestige and for the non-prestige tests have opposite characteristics. The tests in which the suggestion was impersonal show an approximately normal distribution and give the regular bell-shaped curve. But in the tests in which personal suggestion is used, the curve is U-shaped. The subjects tend to fall into two sharply divided groups, those suggestible to prestige and those non- or contra-suggestible.[20]

2. *Negative suggestibility to prestige.* A phenomenon of interest concerning the emotional aspects of suggestibility is that of negativism.[21] Hull (63) found in his experiments upon the postural responses to suggestion that there is often a negative response immediately following the suggestion to sway forward. For some seconds after the forward suggestions are given, the subject either does not move, or sways backward, as much as three inches, finally responding by marked forward movements. This tendency to negativity can be increased by instructing the subject to resist the forward suggestions consciously. A pertinent observation by Williams (152), using the same technique on catatonic patients, is the high percentage of such negative cases. Almost 60 per cent move backward in response to forward suggestion, even moving the feet in order to back farther. It is significant that some of them could be heard saying to themselves in an audible voice "backwards, backwards," during stimulation by the experimenter, indicating that here negativism is a process of active auto-suggestion toward an opposite movement.[22]

A similar trend was observed by Sherif (119) in working with suggestion on the autokinetic phenomenon. In one set of experiments a group situation was used, and one of the subjects was previously instructed to distribute his judgments about a pre-determined norm. It was found that most of the subjects conformed to this imposed norm with only slight deviation. But some of them resented this uniformity and tried consciously to *deviate* from it. Then these men were experimented upon alone the next day, and it

[20] It might be pointed out, however, that Bird (18) feels that if a greater number of subjects were tested, the curves would assume a more normal form.

[21] In an experiment by Brand (24), one of the four subjects showed a definite tendency to react negatively. The subjects were to match the separation distance of two strips of paper, suggestion being introduced in the form of printed symbols, "Long" or "Short." All but one subject made their judgments long or short respectively, with no exceptions. The fourth man almost as clearly reversed the tendency, making them short or long. Pearce (98), working on suggestion and errors of localization (tactual, auditory and visual), found first resistance and then acceptance of the suggestion. The resistance was greatest when the suggestion was opposite to the direction of normal error, but when resistance finally gave way to acceptance, so also was acceptance greater in the direction opposite to normal error.

[22] The U-shaped curves obtained by Aveling, Hargreaves and Estabrooks in response to prestige suggestion will be recalled, and the conclusion drawn from them that a large percentage of the subjects reacted negatively to tests involving the personal element in suggestion.

was found that their reports approached the pre-determined norm even *more* closely than in the group session. Yet their introspections show that they felt they were much more independent in their judgments on the second day.

Finally, as regards the phenomenon of negativism in suggestion, we may point out the results obtained by Travis in an attempt to define suggestibility and negativism as personality traits (139). On the assumption that some mental disorders are characterized by suggestibility and others by negativism, he used as his technique for measuring compliance or resistance the subject's auditory threshold, measured before, during and after daydreaming or reverie. Six psychoneurotics experienced a lowering of threshold during reverie, and six schizophrenics a raising; this, Travis says, is what we should expect from the general suggestibility among psychoneurotics and negativism of the defensive schizophrenics.

Travis put to this test nine normal subjects who had been rated by their acquaintances in terms of their suggestibility or negativism. Eight of the nine showed just such a change of threshold as was expected on the basis of these ratings. Morgan (91) repeated the experiments of Travis and substantiated his results and conclusions. Bartlett, however, published a report (9) of results differing from those of Travis. The difference is explained on the grounds that Bartlett used standard psychophysical procedure and statistical treatment of the results, while Travis used only one or two readings to obtain his difference in threshold.[23]

B. *Prestige in broader "social contexts."*

A second major group of prestige experiments deals with prestige operating at a somewhat more complex level than that of the subject-experimenter relationship. Studies of this sort seem to involve suggestion in a broader 'social' setting than the relatively 'personal' situation of face-to-face individual influence.

1. *Demonstrations of the influence of majority and expert opinion.* Perhaps the earliest experiment employing majority influence is that of Bridges (25), in 1914, a work somewhat neglected in the general enthusiasm over Moore's classical investigation. Bridges studied suggestibility in "aesthetic decisions," using as stimuli picture post cards and cards with geometric figures.[24] Groups of the cards were arranged before the subjects,

[23] Among Bartlett's subjects, one-third had a rise in threshold, which is attributed to relaxation and daydreaming, since sleep raises the threshold. The lowering of threshold in another third is said to be due to uneasiness and disturbance and consequent increase in muscular tonus. Dahms and Jenness (37) "tend to agree with Bartlett."

[24] An interesting precursor of recent experimentation such as that by Birkhoff, Beebe-Center and others on esthetic judgment with polygonal figures.

with the direction, in the non-suggestion situation, "Place the best on your left, the worst on your right," the others in intermediary order of merit. With the suggestion groups the following was always added, "The card most often chosen best is at your left, that most often chosen worst on your right." Few quantitative data are given, but from his results Bridges concludes:

"The general effects of suggestion upon decisions are to lengthen the time and increase the inconstancy. . . . Subjects can be roughly classified into four types on the basis of their suggestibility [but] these types merely signify certain degrees of the trait; for there is probably no absolutely non-suggestible subject, just as there is no purely positively or purely negatively suggestible person. . . . There is a correlation between suggestibility and accuracy. The less the suggestibility, the greater the probability of accuracy." The most suggestible have the poorest memory spans.[25]

In these experiments of Bridges, then, we have early evidence of the effect of 'prestige of majority' in producing acceptance of suggestions.[26] But H. T. Moore (90) was perhaps the first to formulate self-consciously in experimental terms the specific problem of "the influence of the group on the opinions of the individual," and to attack the question of "just how great this influence may be expected to be in any given situation."

His method "is somewhat similar to one used by Bridges . . . it consists of measuring a suggestive influence *in terms* of the number of reversals of judgment occasioned by it, as compared with the number that might have been expected by chance." He used three types of situation, "linguistic judgments," "ethical judgments" and "musical judgments." The first influence inserted was a "statement of what had been the majority preference for each pair." Two days later the second influence was substituted, "a statement of the opinion of an expert in each field." "The results show an average of 48 per cent reversals of language judgments, 47.8 per cent reversals of ethical judgments, and 46.2 per cent reversals in musical judgments." The influence of majority opinion is greatest "in matters of speech and morals." A man is more individualistic in his musical likes

[25] "The suggestible subject may or may not be introspectively aware of his suggestibility. He may think his decision is unbiased or even remember that he decided the same way before, while his memory plays him false and he is really accepting the suggestion." Cf., the later work of Barry (8) and Sherif (119), indicating the same tendency.

[26] Actually, Bridges in this work investigated the relation of more variables (time and variability of decision, accuracy, the influence of "inertia" and position, "originality," memory-span, etc.) than have many of the more recent investigations.

and dislikes than in his moral and linguistic preferences. Speech seems the judgment most subject to "majority prestige." [27]

One of the first of several extensions of this form of investigation is that of Wheeler and Jordan (146) in 1929. They find that group opinion "facilitates agreeing individual opinion" to an extent almost three times chance. Group opinion "inhibits" disagreeing opinions to almost one-half chance. Barry (8) found that 53 out of 67 subjects displayed a tendency to conform to the suggested majority opinion. Barry notes that individuals are characteristically unaware that majority opinion has been effective in altering their previous response.

Marple, in a carefully controlled study (82), substantiated the finding of Moore concerning the greater influence of majority than of expert opinion. For high school seniors, college seniors and adults, greater change was registered toward majority opinion than toward expert opinion, though the difference between majority and expert opinion was greater for high school students than for college students or adults.

Arnett, Davidson and Lewis (2) undertook to discover what changes in attitude would occur under the influence of prestige suggestions aimed to shift attitudes toward a more liberal point of view. Their results indicate that both groups of students tested showed significant changes to liberal attitudes. Further, the members of an advanced class, which had studied Lippmann's "Public Opinion," showed a greater change toward liberalism than did the other group. Analyzing the types of items revealing the highest degree of change, they found that such items all pertained to attitudes on international questions. The lowest per cent of change occurred with propositions on socialism and religion.

The investigations of Kulp and of Bowden, Caldwell and West represent an advance in formulation of the problem, in that they do not rest with simply demonstrating the operation of prestige-suggestion but indicate the possibility of *differential* prestige-value of various sources of suggestion.

Kulp (72) finds that for given propositions certain groups have more effect in influencing judgments than have other groups. He extended Arnett *et al.'s* investigation by employing further sources of prestige. In ranking the sources of suggestion used in terms of the amount of resulting change, educators rank highest, social science experts next, lay citizens last. Simple insertion of checkmarks, without prestige, also produced change.

Bowden, Caldwell and West (22) have shown that in relation to a specific economic problem, different professional groups may reflect differing

[27] Sorokin and Boldyreff (129) also demonstrate the influence of expert opinion in the realm of esthetic judgment. They required subjects to express a preference for one of "two variations" of a musical theme, when the "second variation" was simply a replaying of the first. Only 12 per cent of 1,484 college and high school subjects disagreed with the "expert's opinion." A large number (29 per cent), however, suspended choice.

prestige-values. Concerning the issue of the bimetallic base of our currency, statements attributed to business men, educators and leading citizens were rated highest; ministers came out lowest. This experiment, therefore, establishes for this economic issue a rank-order of prestige according to profession. Bird (18) suggests that the next step is "to establish prestige ranks according to kinds of issue as well." [28]

The studies so far reviewed demonstrate the influence of majority and expert opinion in determining judgments. Unfortunately, they are not entirely free from a criticism directed at the possible circularity of their arguments. In most of these experiments no clear experimental test is made for the presence of the imputed "prestige." The *measure* of prestige-value is the *change of opinion* upon exposure to a statement from a given source. Does it not then become circular to "explain" the *change* as *due* to this prestige?

2. *Actual measurement of the relationship to the prestige-source.* A further advance in experimental technique is therefore displayed in experiments which take a *separate measure* of preference for the suggestion-source and relate the changes in judgment to the demonstrated prestige-rating. Such experiments are fewer in number, but the value of their results would seem to be enhanced by their more defensible procedure.

Farnsworth and Misumi (44) extended a former investigation of suggestion in pictures (43) to discover the influence of artists' names on the preference value of pictures. Selecting the four best-known and the four least-known names from a check list of fifty, they attached these names to rating-sheets for pictures. As a sample of their results, a picture attributed to *Da Vinci* received a mean rating of 3.37, while the same picture attributed to *Doughty* was rated 3.80. The differences were not statistically significant, but "they would appear to indicate that artists' names have some potency in the preference value of pictures." [29]

Sherif (118) measured preferences of subjects for 16 authors, and then obtained preferences for 16 literary passages when one passage was attributed

[28] Menefee (86), presenting political statements together with labels as to their origin (Communist, Fascist, etc.), discovered that a majority of laymen refused (apparently out of suspicion or fear) to answer the questionnaire containing these labels. Bird interprets these unexpected results as evidence for an "order of potency [of verbal stereotypes] in eliciting attitudes," providing "another refinement in the field of suggestion and propaganda" (18, *p.* 297).

[29] Saadi and Farnsworth (106) showed that statements offered with the indication that well-liked or disliked persons have made them will be accepted or rejected more definitely than the same statements offered with no comment. Their differences are not statistically significant, however.

to each of the authors. Though all 16 passages were from the same author, Robert Louis Stevenson, preference for the passages varied with regard for their "authors." Comparable results were obtained from subjects in both America and Turkey.

Lorge (79) asked 99 unemployed adults to indicate their regard for the political opinions of well-known authorities and to rank quotations correctly or incorrectly attributed to these authorities. In general, when the regard for the true authority was higher than for the incorrect authority, the quotations were rated more favorably. When regard for the true authority was lower than for the incorrect authority, quotations were rated less favorably.

Cantril (27) found that by affixing the names of certain men to such materials as musical compositions, literature, or political opinions, the subjects were induced to rank the selections in an order closely corresponding to the order in which they had previously ranked the given men.[30]

From such experiments as those reviewed in this section, we may say with some confidence that the *source* of the suggestion is an important factor in determining its acceptance. The sources most thoroughly investigated may be classed under three heads: (1) the personal influence of the experimenter in a face-to-face situation, (2) the influence of knowledge of "expert opinion" and (3) the influence of group or majority opinion. We may say, in addition, that the relative 'potency' of a prestige-source is dependent in part upon the particular suggestion-situation. Personal influence seems more frequently to have either a decided positive or a negative effect on response, than a neutral effect. The effectiveness of group opinion as compared with expert opinion appears also to depend on the issue being judged. The more closely the issue relates to "social norms," the more influential the group opinion, while problems relating to "personal norms" are less influenced by group judgment. Expert opinion may operate more strongly in certain "technical" matters. However, the prestige-value of various "expert" sources depends again upon the problem at issue. Economic dicta "by ministers" are not so influential as similar statements "by business men." Finally, the degree to which individuals are influenced by a source depends upon the degree of their regard for the source.

[30] A further interesting point brought out by this experiment is that, contrary to certain former expectations, the amount of training the subjects had had in a field did not greatly affect their suggestibility. Graduate students in English accepted the suggestions in literature as fully as did the more naïve undergraduates. Sophistication, it seems, is not always a guarantee against suggestibility.

III. SUGGESTIBILITY AS A "TRAIT"

The last group of experiments to be reviewed deals with the conditions under which "suggestibility" is to be found, including the influence of such factors as age, sex, race, intelligence, unusual mental conditions, and the factor of individual differences, comparing the results of different suggestibility tests to determine whether suggestibility can be established as a consistent character or personality trait in individuals.[31]

As regards the age factor, most experimenters agree that suggestibility is higher in children than in adults, and that it may increase from infancy to approximately age 7 or 9 and decrease progressively from then on. Experiments supporting this conclusion are those of Small (128), Gilbert (48), Ross (105), Yung (cited in Simmons, 125), Giroud (16), Papov (cited in Young, 158), Messerschmidt (87), Reymert and Kohn (101), Sherman (123), Binet (16), and Guidi (49). Hurlock (64) and Young (156) are exceptional in finding no decrease in suggestibility with age.

On the relation of suggestibility to sex, the most common finding points toward somewhat greater suggestibility on the part of women and girls than with men and boys. Brown (26), Heron (57), McGeoch (84), Hull (63), Bowden, Caldwell and West (22), Wegrocki (144), Lodge (78), and Seashore (117) note this relationship. However, Aveling and Hargreaves (5), Papov (158), Manzer (81) and Otis (97) find women or girls *less* suggestible than men or boys, and Reynolds (125) finds no sex difference among preschool children with regard to negativism. Brown analyzes sex differences on his many tests of suggestibility, and concludes that the type of situation studied is an important factor, a conclusion to which Murphy and Murphy give hearty assent.[32]

The results of studies on the relationship of suggestibility to intelligence again show a lack of entire correspondence of obtained results. McGeoch (84), R. S. White (149), Otis (97), and Simmons (125) find an *inverse* relationship. Reynolds (cited in Simmons, 125), Young (156), Bessen (cited in Simmons, 125) and Reymert and Kohn (101) find *little or no* relationship; Hull (63) finds a slight *positive* relationship; and Jones (68) finds 5 superior children *more* suggestible than 5 dull children. Bird (18), reviewing such investigations, concludes that there is "little

[31] In view of the excessive number of studies in these fields, no attempt will be made to detail their procedures or results. A more lengthy discussion of these and similar experiments may be found in Simmons (125). Cf., also, Murphy and Murphy (93), Hull (63), and Bird (18).

[32] *E.g.*, Brown found that the sex of the tester makes a difference in the results obtained. In one case, 78 per cent of the women and 40 per cent of the men yielded to a man testing. In another, 83 per cent of the men and 64 per cent of the women yielded to a woman.

relationship," and that "experience and age are more important agents in suggestibility than intelligence *per se*."[33]

The rôles of other personality factors in suggestibility have been less extensively investigated, but here too exist certain disagreements in findings. Cushing and Ruch (36) find delinquent girls more than normally suggestible; Hull (63) finds them *negatively* suggestible. Naumov (cited in Young, 158) finds "insane patients" four times as suggestible as normal adults; Hull concludes that catatonic dementia praecox patients are negatively suggestible and that schizophrenics are non-suggestible. Travis (139) and Morgan (91) hold that psychoneurotics are suggestible and schizophrenics negativistic, but the work of Bartlett (9) and of Dahms and Jenness (37) casts doubt upon the methods employed. Young (156) finds negroes more suggestible than whites.

Perhaps the suggestible person is the one who can easily be hypnotized. White (148) found a correlation of .75 with his scale of hypnotizability and suggestibility. But Wells (145) claims to find a low *negative* correlation.[34] Hull considers it advisable here to distinguish between types of suggestibility: direct verbal or prestige suggestibility (which correlates well with susceptibility to hypnosis), and indirect or non-prestige suggestibility (which correlates poorly with hypnotizability and with direct prestige suggestibility).

Many investigations have been concerned with determining what degree of correlation exists between various tests of suggestibility, and whether suggestibility can be established as a consistent personality trait. Binet (16), Pearce (98), Otis (97), and Aveling and Hargreaves (5) hold for a general factor of suggestibility. Most experimenters and reviewers, however, incline toward an interpretation involving many types of suggestibility, which may correlate only slightly with each other. Scott (108), Chojecki (35), Okabe (under Whipple, 147), Brown (26), Bessen (cited in Simmons, 125), McGeoch (84), Stevick (135) and Hull (63) find zero or very low correlations between various tests of suggestibility. Murphy and Murphy (93), Hull (63), Dorcus and Shaffer (40) and Bird (18) are skeptical of a consistent trait of suggestibility. Some experimenters have found a slight relationship between suggestibility and "a group of traits characterized by general amiability": Barry (8), Baumgartner (11).

[33] "Experience," in terms of conventional "education," may fail to produce resistance to suggestion. Cantril (27) found that major students in English and students taking music courses were as suggestible in these fields as were "naïve" students.

[34] Furthermore, the work of Hull and his colleagues tends to show that almost any one of the phenomena commonly accepted as hypnotic (the types of behavior on which White built his scale) can easily be induced in the waking state as well as in hypnosis.

What generalizations can we draw from this material? It seems, primarily, as though suggestion may be a general term embracing many psychological processes. We find from the low intercorrelations of tests that in referring to suggestibility we are not able to speak glibly of high and low degrees of suggestibility, but that we are forced to specify the particular conditions under which the degree of suggestibility has been observed.

The low correlations of suggestibility scores of large groups of boys and girls and men and women, as well as the low correlations between several tests given one individual bear out this interpretation. The evidence does not point conclusively to any uniform difference between the sexes or even to a consistent difference between individuals. There is some correlation with age. In general, the younger the child the more receptive, save to around 7 or 8, before which he may not have learned well the language symbols. In the decreasing suggestibility of the child, evidently the increase of knowledge with age is more important than the increase of intelligence, perhaps because knowledge furnishes many associations to compete with the suggested ideas for the control of behavior. Another factor that must be considered with age is the type of situation, since the prestige factor is found to be more influential at the younger ages. The skill and personality of the experimenter is also influential in the measurement of suggestion, and the fact that much of the testing has been done by men may have something to do with whatever tendency there may be for women to score higher than men. In general, the particular conditions of investigation seem almost as important as do the "characteristics" of individuals or groups being studied.

CHAPTER II

EXEGESIS: DEVELOPMENT OF OUR PROBLEM

Present Status of Suggestion

P. C. Young (157) has proposed an "analysis of the series of acts and conditions which go to make up suggestion," that may serve as a framework within which to view the present status of suggestion. Young sees the concept of suggestion as involving such possible conditions as the content of the suggestion, characteristics of the suggestor or the source of the suggestion, the relation of the suggestor to the suggestee, "permanent traits" or temporary "states of mind" of the suggestee, the trend or motive appealed to by the suggestion, and the method of communication.

In consideration of the variety of stimuli and responses employed in experiments, we are able to say that suggestion may be effective in terms of practically any of the sensory modalities; that it may be expressed through verbal or non-verbal symbols; and that it may pertain to responses of widely varying degrees of complexity: from relatively simple sensory-motor responses through perceptual illusions to complex judgmental and attitudinal responses. Experiments relating to these problems, however, have been criticized (94) as too frequently resting with demonstration of the fact that a given kind of stimulus or form of response *may* be utilized in the suggestion process. Such experiments, it is said, rarely go farther and attempt to discover *why* these stimuli and responses are effective. It does not at present, therefore, appear feasible to refer the operation of suggestion simply to the "content" of the suggestion.

Theories have been proposed which would make the "source" the efficient condition of suggestion, by virtue of "dominance" or "prestige" of the suggestor. But available data indicate that the effective source of suggestion may be almost any kind of stimulus, personal or non-personal.[35] The heterogeneity of sources demonstrably effective in producing suggestion renders implausible a consideration of the source, *per se,* as constituting a crucial condition of acceptance-rejectance.

For example, "prestige" seems to be relational rather than an absolute characteristic of the source. Concepts such as McDougall's rapport and the Freudian love-relation emphasize the relation of the suggestor to the suggestee. The experiments of Aveling and Hargreaves and of Estabrooks indicate that the "emotional relation of the subject to the experimenter"

[35] Typical non-personal sources investigated have been tactual, thermal, electrical, olfactory, visual and auditory stimuli. Personal sources investigated have been the experimenter himself, "expert opinion" and "group" or "majority opinion" as the source.

may be important in conditioning prestige suggestibility. It is possible, *e.g.,* that a difference in sex between the experimenter and the subject may be an important factor. We have as yet, however, few adequate measurements which would characterize for us the nature of this "emotional relation" and what conditions make for rejection of suggestions.

Prestige suggestion of the type operative in experiments on influence of majority and expert opinion appears also to depend on the relation between the group investigated and the particular majority-source or expert-source employed. Experiments in which this relation itself has been measured, as well as the concomitant suggestibility, indicate that when the source of the suggestion is an "expert" or an "authority," the more highly regarded this individual, the greater will be the acceptance of propositions attributed to him. When the source is group or majority opinion, acceptance again appears to depend on relational factors.[36] We may conclude from these investigations that the *relationship* between the source and other factors in the situation is a more important condition of suggestion than is simply the nature of the source itself.

Attempts have been made to explain suggestion in terms of relatively "permanent" traits of the suggestee, such as his neurotic constitution, the amount of his submissive instinct, his tendency toward dissociation, or some other characteristic such as ignorance or credulity. Very moderate success attaches to the many efforts to isolate a consistent *trait* of suggestibility, or to define a suggestible *type* in terms of relatively stable characteristics of the suggestee such as race, sex, intelligence, or personality traits. While these factors are undoubtedly contributive, it is probably advisable to consider also the influence of "temporary" conditions of the suggestee, such as fatigue, emotional excitement, misdirection of attention, and the inhibition of competing reaction-tendencies.[37]

A further condition sometimes cited is the appeal of the suggestor to a basic trend or motive within the suggestee. McDougall speaks of submissiveness; Freud, of the evocation of a primitive father-son relationship; Trotter, of the herd instinct.[38] While the effects of prestige suggestion are

[36] *E.g.,* majority opinion appears to be more effective as a source in the relation to linguistic judgments than in relation to musical judgments, and more effective in influencing responses of conservatives than in influencing radicals. It has been pointed out that an important factor to consider here is that of "*group membership.*" Asch (4) comments that investigators commonly have inquired into the effect of "the" group or of "a" group. "In fact, these investigations have with great uniformity been focussed on the rôle of congenial groups, with which the individual identifies himself wholly or in part, or of which he considers himself a member. . . . It need hardly be pointed out that this approach is limited."

[37] Young comments that explanation of suggestion on the basis of "the state of consciousness of the suggestee [by way of 'the ideomotor or ideoreflex theory . . . or a state of conviction without adequate grounds'] . . . really gives us a description of the state of mind in suggestion; but not an explanation as to *how* that state of mind comes about." Katz and Schanck (69), recognizing the difficulty of defining a concept, "the hallmark of which has been its relation to conscious processes," implement the description of the condition of the suggestee, and how this comes about, by reference to the restriction of the individual's field of behavior by diversion of his attention or by the inhibition of his "symbolic implicit reactions" (ideational responses).

[38] Young remarks that "all possible motives may characterize the suggestee" and fears that proponents of this sort of theory may be "guilty of making one possible factor the first and main cause of suggestion."

often referred to "social motives such as dependence upon, fear of, or fondness for, some person" (94, *p. 135*), experimental work on motivation has been confined largely to the measurement of regard for the source of suggestion. Definition of motives appealed to by the suggestion itself has rarely been experimentally pursued.

Finally, Young has proposed the "method of communication" of the suggestion as a "definitive element" in the process. He holds the critical factor to be *indirection* of communication. "It is a method of indirect appeal to the person to be influenced." Though this definition might appear to leave no place for "direct suggestion," Young considers that one aspect of this method "consists in inhibiting the action of the more strictly critical intellectual functions" by concealing the "true nature" of the communication [*i.e.*, 'diversion of attention: indirect suggestion' (69)] or by emotional appeals, monotony, etc. [*i.e.*, 'inhibition of ideational responses: direct suggestion']. Thus the factor of method of communication seems acceptable in accord with traditional usage.

We find ourselves, then, relatively clear regarding the importance of the relation of the suggestee to the source of the suggestion, of certain temporary conditions of the suggestee (or of methods employed to induce these conditions), and perhaps of certain motives appealed to by the suggestion. Experimental data are not so definitive in regard to the importance of the content of the suggestion, specific characteristics of the suggestor, or permanent traits of the suggestee. Do these factors exhaust the possibilities of the "conditions of suggestion"? Surely their investigation has delineated aspects of the process whereby may be drawn a meaningful picture of the operation of suggestion. Is it also possible that continued investigation may reveal additional details which might permit a further degree of clarification?

That such a possibility exists seems reflected in the comments of certain reviewers. Hull (61) speaks for the importance of an "objective knowledge" of the phenomena of suggestion, yet he considers that, "Up to the present time the experimental work on suggestion has been relatively coarse and, for the most part, rather superficial in nature."[39] Murphy, Murphy and Newcomb also suggest the feasibility of further investigation of conditions underlying this form of behavior:

[39] In connection with a field conceived by him as closely allied to suggestion, namely hypnosis, Hull has brought to attention an almost startling contrast in the status of two lines of investigation: "It will be recalled that Mesmer was a contemporary of Benjamin Franklin. During the period of something over a century and a half since Franklin's kite experiment (1752), electricity has developed into one of the most exact and quantitative sciences in existence. After approximately the same period (Mesmer propounded to the scientific world his views on animal magnetism in 1775), we find hypnotism for the most part still languishing in the hands of charlatans and mystery mongers. Except for a little notable work performed during the last decade, scarcely anything of scientific significance has been done for a century. During this period almost nothing has been accomplished save the more or less imperfect correction of experimental blunders committed by earlier workers" (62. *pp. 200–201*).

"Although the quantity of experimental work on suggestion has become voluminous, it can scarcely be maintained that our understanding has been increased proportionally. To review all the experiments on suggestion and suggestibility would be an idle and thankless task; a large proportion of these really do nothing more than pick out some obvious instances of human gullibility, prey upon them, and give the results pseudo-quantitative form by ascertaining what percentage of the subjects 'yield.' As if this were not in itself sufficiently futile with regard to the problem of getting at the nature of suggestibility, the situation is usually made worse by confusing three quite distinct human tendencies: . . .

"All these points have been made before, but it is remarkable that new experimental studies of suggestion continue to appear in which, instead of the more precise analysis of the behavior involved or the conditions underlying it, we are presented with a medley of results which are simply reported as scores on a suggestibility test. Now if what we desire is to know in a general way whether a person stands in the top decile or the bottom decile in suggestibility, in the sense that out of a hundred given situations he showed suggestibility in a very small or a very large number of cases, there is, of course, value in such investigations. But even so, we have really learned little until the experimenter sifts out for us the specific kinds of 'suggestibility' which are evidenced by particular kinds of behavior on the test." (94, *pp. 168–170.*)

In the interests of further analysis of conditions influencing behavior in the suggestion situation, it is the attempt of the present work systematically to explore certain factors in suggestion which to date, though not unrecognized, appear to have received less emphasis and less extensive investigation than have a number of such conditions as we have reviewed above.

PROBLEMS OF THIS INVESTIGATION

Two observations of behavior in suggestion situations will indicate the nature of our problems. If we observe the reactions of groups in experiments on suggestion we note, first, that they are not merely being "suggestible" or "non-suggestible," accepting or rejecting suggestions-in-general, but that commonly they accept some suggestions and reject other suggestions. Why are these particular suggestions accepted and certain others rejected by the groups being studied? This is the issue of our first inquiry. Secondly, if we compare reactions of groups in one situation with group reactions in another situation, we note that the frequency of acceptance may vary from one situation to another, in a manner which seems to depend more directly upon characteristics of the situation itself rather than upon the nature of the suggestions given or upon the composition of the groups.

The second issue of this investigation concerns certain of these "situational characteristics" which may elicit differential suggestibility from our groups.

This approach to suggestion adopts the hypothesis that suggestion may be a case of what Watson and Hartmann (142) have termed "framework responses," responses determined by a controlling pattern of attitudes dominating the interpretation of given stimuli. Watson and Hartmann express the concept in these terms:

"Explanation of many of the 'higher' mental processes has insistently demanded the postulation of some controlling pattern such as apperceptive mass, *Einstellung,* determining tendency, delusional system, postural adjustment, sensory orientation, value hierarchy, means-ends readinesses, personality radix, master attitude, etc. Recent discussions in education, politics, philosophy, and the 'sociology of knowledge' have independently developed the notions of a frame of reference, pyramid of goods, ideology, or world-model as dominating individual or group interpretation of experiences. Recent field, clinical, and laboratory studies suggest that a fruitful union of these two academic traditions in the inclusive concept of 'framework reactions' results in a better understanding of many features of adult behavior, particularly the obscurer phenomena of social psychology." (142, *p. 314.*)

By examining the nature of suggestions accepted and rejected by groups displaying various attitudinal patterns, it may be possible to determine whether these frameworks operate in suggestion to "dominate individual or group interpretation of experiences."

But in addition to the control imposed by these subjective "frames," behavior is also governed by the patterning of the external stimulus-situation. In some situations the stimuli are, as Sherif says, so "well structured" as to force a given type of reaction; in other situations, such clear-cut patterning may be lacking, leaving the stimuli open to a variety of interpretations.[40] How, then, will suggestibility vary with the definiteness or ambiguity of the stimulus-situation?

That receptivity to suggestion may depend in part upon the character of the situation may be seen in certain instances of social behavior. To step outside the laboratory for an example, the readiness of Germans to accept Nazi 'suggestions' in the early 1930's may have been conditioned in no small part by their unsatisfactory and confused economic-political situation, not entirely by the specific content of Nazi proposals. (Cf. Cantril, 32, chaps. 8 and 9.) Another illustration is found in the Beard's analysis (12) of the situation in the United States at the time of President Roosevelt's election in 1932. Their description implies that the voters in the winter of 1932–33 were ready to accept (and that Congress was even eager for) a

[40] Cf. M. Sherif, *The Psychology of Social Norms* (120), especially Chapter IV, for a discussion of various "stimulus situations in social psychology."

more radical course of action (abolishing the stock exchange, etc.) than actually the President cared to adopt. But within a few months, as the economic situation became more favorable, their receptivity to a radical program underwent a sharp decline and opposition to "New Dealism" began to spring up.

On the basis of the questions outlined above, we have selected two major spheres of investigation: *suggestion as a function of attitudinal relationships,* and *suggestion as a function of situational structures.* Our specific problems may be arranged as variations of these general contextual relationships.

1. Among individuals of widely varying attitudes toward a social situation, will their acceptance of current propagandas concerning this event be related to their expressed attitudes? Can individuals expressing similar attitudes be grouped together and can the groups be characterized as being "suggestible" to specific propagandas and "unsuggestible" or negatively suggestible to other specific items? Do groups displaying more "decided" or extreme opinions vary less in suggestibility to specific propaganda than groups of "undecided" opinion? Is there a discernible relation between suggestibility to propaganda and acquaintance with relevant factual material?

2. The second problem takes up the question of suggestibility in an ambiguous stimulus-situation. It has been shown that subjects will agree to suggested descriptions of a situation, when the description is verbalized by the experimenter himself: they will assent to a statement or leading question. But can response to perceptual data be suggestively influenced beyond a point of passive *assent*? Can suggestion direct the subject's own verbalizations? Can we make the subject actively *construct* the situation in accordance with suggestion, not simply *accept* an imposed construction? And further, will the subject interpret the situation according to any and every suggestion offered, or is his interpretation demonstrably related to existing attitudes not specifically associated with the given stimulus-situation?

3. Related to ambiguity may be the factor of the complexity or difficulty of the situation to which the subject is required to respond. In what manner will suggestibility vary when individuals are faced with tasks of graded difficulty? Further, the subjective "difficulty" of a task may well be dependent upon the amount of pertinent knowledge or information at the individual's disposal. Will we find varying degrees of suggestibility among subjects with different levels of knowledge or training in respect to the task?

4. Finally, what of differing degrees of definiteness or ambiguity of the stimulus? In a situation requiring sensory judgments, will subjects be more responsive to suggestions when judging stimulus aspects which are relatively definite and unambiguous, or more suggestible when the aspect to be discriminated is vague, indefinite, ambiguous? With varying degrees of ambiguity will we find varying degrees of suggestion-acceptance? This question will be tested in a situation in which the subject himself manipulates the stimulus, rather than passively judging stimuli as presented by the experimenter.

The new emphasis in this approach is that we do not view the subject as an individual primarily "suggestible" or "non-suggestible" and set out to determine why he is so, but that we anticipate the likelihood of differential acceptance-rejectance, conditioned by the patterning of the specific suggestion-situation. Our effort here is not simply to discover whether given subjects are suggestible, but to discover how attitudinal frameworks relate to the acceptance of particular suggestions and what stimulus characteristics promote ready acceptance. Our problems thus embody the systematic investigation of both internal and external contexts of the suggestion-process.

It is felt that this approach takes account of certain of the criticisms which have been directed at "a large proportion" of the experiments on suggestion; and that, while they are consonant with previous experimental and theoretical formulations, the present techniques emphasize factors which may have been relatively neglected among the conditions of suggestion. It may be hoped that the level of description upon which we attack these problems is one which will prove fruitful to the conceptual and predictive needs of the student of personality and of contemporary social issues.

CHAPTER III

ATTITUDINAL CONDITIONS OF SUGGESTION

Purpose

THE fundamental problem of the first experiment concerns the influence on acceptance-rejectance behavior of the motive or attitude appealed to by the suggestions. As compared with the extensive exploration of other variables, there perhaps have been relatively fewer investigations directed specifically at this problem.

Studies of "change of attitude" under the influence of argument, discussion, motion pictures, and various types of propaganda not infrequently contain results indicating that "change" is more easily produced in directions concordant with previous attitudes and that "resistance" is encountered in the endeavor to modify certain types of attitudes [*e.g.,* Millson (89), Robinson (104), Knower (70, 71)]. Commonly, however, the procedure of these investigations is to measure a given attitude, present "influential" materials, and retest the attitude to discover what degree of modification has resulted. The problem of the rôle of the existing attitude in determining *acceptance* of the propaganda is usually secondary to that of how much *change* of the attitude may be induced. Differential acceptance of the propaganda is often an unexpected interferent with anticipated findings.

This is illustrated in Hartmann's attempt to measure the effectiveness of "short-term" and "long-term" political objectives (56). Instead of the anticipated increment in votes for the candidate endorsed, he found an actual shrinkage of the vote, which lead him to conclude that "political propaganda is influential only to the extent that it is an expression of the present desires, sentiments, prejudices, interests and limitations of those to whom it is addressed."[41] Wegrocki (144) obtained similar results, in a study of the effect of prestige suggestion on emotional attitudes of Catholic children. While many attitudes were definitely changed toward agreement with the suggestions, certain items were not amenable to change. The inference is drawn here that items related to the church and viewed as infallible doctrine were not capable of being changed by the suggestions.[42]

An earlier experiment which employed a technique yielding pertinent data is Langfeld's investigation (73) of suggestion in judgments of facial

[41] The well-known experiments of Lund (80) will be recalled, with their high correlations (.76) between desire and belief.

[42] Among investigations of prestige suggestion, we have already noted (Chapter I) the importance of the relationship between acceptance and regard for the source of suggestions. These findings, while significant, bear more directly on the function of attitudes toward the *source* of suggestions. The present questions have to do with attitudes toward their *content.*

expression. In this study, the subjects were first given the opportunity to form their own judgments of the expressions portrayed, and were then given "correct" or "incorrect" suggestions as to their titles. The total per cent of "correct" suggestions accepted was 73 per cent; but if the correct (artist's) title approximated their own judgments the subjects accepted *more* than the average (97 per cent), while if their own did not approximate the artist's title, they accepted *less* than the average (61 per cent). Again, when incorrect titles were suggested, the average acceptance was 41 per cent; but where the original judgments had not approximated the artist's titles (though these had subsequently been "approved"), subjects accepted *more* than the average of incorrect titles (49 per cent), and where the artist's titles had originally been approximated, they accepted *less* than the average (34 per cent). These results indicate that when the subject is allowed to experience the suggestion-material previously to the introduction of the suggestion, he accepts more readily suggestions which accord with his original responses (whether these were correct or incorrect), resisting suggestions opposed to his pre-determined judgments.[43]

Our present purpose is to investigate farther the influence of motivational or attitudinal factors in suggestion, with explicit reference to the relationship between pre-existing attitudes and the content of accepted suggestions. Considering propaganda as a special instance of suggestion, results such as those reviewed above suggest that there may be "selective" receptivity to propaganda.[44] Our problem involves the measurement, not only of the "selective" acceptance of propaganda, but also (to avoid circularity of reasoning) of the expression of relevant attitudes, and of the degree of relationship between these two variables.

Specifically, our questions may be stated thus: Given individuals with widely varying attitudes toward a social situation, will their acceptance of

[43] Chapman and Volkmann (34) show that subjects who have experienced the experimental material are less suggestible than subjects to whom the material is novel. Langfeld's experiment, however, defines this relationship more precisely, indicating that the "suggestibility" depends on the *nature* of the previous experience and the 'set' thereby formed.

[44] One occasionally meets 'on the street' a tendency to reify the "power" of propaganda, to consider that propaganda is accepted because it is propaganda. There is some tendency to fear propaganda, as an instrument which "forces" men in directions "against their will"; popular descriptions have been given of the "effect of propaganda in getting us into the last world war," and the danger that it may "force us into another war against our wishes." Thus the question is raised, are we "propagandized against our wishes" into some action or belief?

The present study envisages the possibility expressed by Hartmann (55), that "Those ideas will be most readily assimilated by the voter which fit in with his present 'apperceptive mass,' which are joined with some prepotent wants, which meet him on his own level and lead him on from where he is." As regards the rôle of propaganda in the last war, *e.g.*, Millis (88) attributes the greater effectiveness of Allied over German propaganda in the United States to the *predisposition* of the American public to receive it, rather than to any notable superiority in Allied propaganda-technique. Concluding her study of judgments and attitudes, Lewis (75) suggests the hypothesis that "judgments of political materials can be changed to the extent that the externally introduced reference point can be reasonably incorporated into the subjects' already existing frame of reference."

current propagandas concerning this situation be related to their expressed attitudes? Can individuals expressing similar attitudes be grouped together and the groups be characterized as being "suggestible" to specific propagandas and "unsuggestible" or negatively suggestible to other specific items? Do groups displaying more "decided" or extreme opinions vary less in their suggestibility to specific propagandas than groups of "undecided" opinion? Is there a discernible relation between suggestibility to propaganda and acquaintance with relevant factual material?

METHOD

For testing these questions we sought a situation concerning which there was current propaganda available and toward which there might be rather extensive variation in direction and strength of attitudes. The war in Europe offered itself as a significant issue meeting these requirements. At the time of this investigation (the winter of 1939–40) opinion on the war was less unified than it now may be, and the experimenter had learned from casual conversation that within his college classes there were individuals representing all shades of opinion toward the belligerents. Taking advantage of these facts, we prepared a questionnaire containing propaganda-items bearing on the war (as it stood in January, 1940) and a test of attitudes toward the belligerents.

Part A

Allied-German Propaganda

MATERIALS

A large number of propaganda items were selected from current newspapers and from magazines such as *Time* and *Life,* items which these sources had characterized as rumor or propaganda. From these, plus a few similar statements composed by the experimenter, a group of five judges (the experimenter, a second instructor in psychology, and three advanced undergraduate majors in psychology) selected 25 statements as being typical of current propaganda and as presenting controversial topics on which there would be probable diversity of opinion. In response to these statements the subject was asked to indicate whether he considered them True, False, Probable or Improbable.

More of the rumors available from our sources were favorable to the Allies than to the Germans. For this reason and for convenience in scoring, it was deemed advisable to score all rumors from the standpoint

of their favorability to the Allies. The five judges decided upon which response to a question, "True" or "False," most favored the Allied position. If the rumor as it stood favored the Allies, it was considered that the pro-Ally response would be "True"; if it favored the Germans, it was considered that the pro-Ally response would be "False." A scoring stencil was then constructed, employing the pro-Ally interpretation for each item. This stencil was applied to all questionnaires, and all scores appear as the number of "pro-Ally interpretations" accepted by each individual or group. The propaganda items and their pro-Ally scoring appear below:

The bomb that exploded in the Munich beer-hall was planted by the Germans themselves, a fake assassination plot to bring the Führer close to glorified martyrdom and thus rally waning popular support for Hitler's regime. (True)

Though everyone supposes that, with all the time there has been to make ready, Britain's Air Raid Precautions are adequate to and will save the civilian population from such horrors as were seen in Barcelona and Madrid, London shelters are in reality miserably inadequate and fifty per cent of even Barcelona's population had much better protection than now exists in Britain. (False)

It is now clear that at least 10 of the 26 German midgets who worked in the Lilliputian Village at the New York World's Fair last summer were capitalizing on their small size to conceal their real activity, spying in the United States for the German government. (True)

The Simon-Reynaud trade agreement between Britain and France has brought such financial and trade solidarity between the Allies that there is no hope of Germany's splitting them asunder. (True)

The Nazis have set the seal of official approval on bastardy. Gestapo Chief Himmler and Deputy Führer Hess have made it plain that German women and girls are now expected to submit to the demands of German soldiers moving to the front, and, married or unmarried, to bear their children. (True)

The repeal of the arms embargo will enable the United States to supply the Allies with so many planes that Germany will soon be swamped. (True)

Britain's answer to Germany's increased mine-war is a new technique in mine-sweeping: throwing a magnetic field several hundred feet ahead of a sweeper to do the work of exploding magnetic mines. (True)

Germany has recently changed to the construction of submarines on the production-belt plan, at a rate of one per day, thus putting her well ahead of the British destruction-rate, and raising to a new high the danger to Britain's life lines. (False)

The French have now deepened and lengthened their Maginot Line so

that it cannot now be flanked, and is even so strong the French can move out from it and strike the Germans in offensive action. (True)

The reason for Germany's failure to open up a major Blitzkrieg or "total war" is disclosed in the fact that with the failure of expected imports from Russia and Rumania, she is beginning to experience a serious oil shortage, having available less than half the supply required for extensive fighting. (True)

British pursuit ships (such as the Hawker Hurricane) are faster, more maneuverable and better fighters than German ships (such as the Messerschmitt). (True)

The spirit of the Allies is not as brotherly as they would have the world believe; there has been considerable friction and actual hand-to-hand fighting between the British and French front line armies, the French objecting that the Tommies' higher pay-rate enables them to "get all the women." (False)

A rift is developing in the high circles of the Nazi Party: Göring is in disgrace and on the skids, and has recently indulged in many angry outbursts against Hitler's policy, while Hitler has refused for some weeks to see Göring more than perfunctorily. (True)

Britain and France hope to see, as a result of the war, a free democracy of all the European nations; a European federation of free and equal states calculated to wipe out fierce commercial rivalries, customs frontiers, expensive armies, national enmities. (True)

France and Britain aim through this war finally to conquer and dominate all of Western Europe, bringing the various present nationalities under the subjugation of enlarged and triumphant French and British Empires. (False)

The present World War is planned by Germany not merely for the purpose of recovering former German territories, but fundamentally as a part of a vast, Nazi-led international revolution destined to crush capitalistic society and usher in a "Socialistic millenium" under Nazi world-domination. (True)

All the top men in Nazi Germany long ago took care to deposit fortunes and take out big insurance policies outside of Germany. Not only does this show the Nazi chiefs prepared to run, but it is particularly interesting in view of the fact that hoarding money outside Germany is a crime in Germany punishable by death. (True)

Marshal Göring is fearful of German internal strength and has secretly been dickering with the Allies for peace, unknown to Hitler. (True)

The reason the Germans have failed so far to produce any major drives against the Allies with their reputedly all-powerful military machine is that the Reich is in reality so weak in its internal economy that it actually could not support such a major effort. (True)

The French and British Empires have permanently dismissed national egoism and have come to an agreement on community of action leading to a hopeful and peaceful United States of Europe. (True)

The Germans have deliberately bombed the residential districts of defenseless cities in Poland and England. (True)

With the loss of more capital ships than occurred during the whole of the last war, the retreat of the British Fleet from the North Sea and North Atlantic, the success of the German torpedo and mine war on Allied shipping, the increase of German submarine and plane production, the failure of France to pierce the Siegfried line, the breakup of the British cabinet, the increasing dissension between Allied governments and soldiers, Britain and France would require only a sudden concentrated push on the part of German aerial, naval and military might, to topple and fall to defeat. (False)

British airplanes have willfully violated the neutrality of Belgium and other neutrals. (False)

The *Athenia* was sunk by a German submarine. (True)

With the loss of the "Graf Spee," the destruction of almost all of the large submarine fleet with which Germany began the war, the failure of bombing raids and sinking of merchant vessels to bring England to her knees, under increasing pressure from the British blockade unrelieved by the expected Russian supplies and with internal dissension mounting, Germany is rapidly being brought to the point of defeat and Allied victory is drawing rapidly nearer. (True)

To provide an indication of attitude toward the belligerents, an attitude-test was included in the questionnaire. This was made up of questions drawn largely from the *Fortune* Surveys for November and December, 1939, and January, 1940. These questions appear below:

Which of these statements comes closest to your own idea of Great Britain?

Great Britain deserves no special sympathy, as she has grown by the same methods employed by Germany today.

Britain is decent enough, but her propaganda should not obscure our own interest in staying out of the war.

The British are probably no angels, but our vital interests are tied up in the maintenance of her Empire, and her navy protects our commerce.

The British have a special claim on our sympathy because they are closest to us in ties of blood and language and are defenders of democracy with us.

Which one of these reasons comes closest to describing your own idea as to the real cause of the present European war?

The German people always want to have things their own way, even if it brings a war.

Hitler's greed for land and lust for power.
Germany's (or Hitler's) desire to regain all possessions lost in the last war.
The Treaty of Versailles—it was unfair to Germany.
England and France are trying to keep Germany from becoming a really strong power.

Which of these statements comes closest to your own idea of Germany?

The aggressive character of the German people makes an armed Germany a menace to peace.
The Germans are peace-loving, but have been too often misled by ruthless rulers.
Germany is forced to fight because jealous powers oppose her normal expansion.
The best way to peace is to allow Germany to integrate the small nations of Central Europe.

What do you think the United States should do?

Fight with the Allies now.
Fight with the Allies if they are losing.
Send supplies to the Allies but not to the Germans.
Sell to both sides cash and carry.
Give no aid to either.
Help Germany.

Would you please indicate on a scale of 1 (extreme liking) to 10 (extreme dislike) your liking for each of these countries? Simply circle the number which indicates your feeling.

England	1	2	3	4	5	6	7	8	9	10
Finland	1	2	3	4	5	6	7	8	9	10
France	1	2	3	4	5	6	7	8	9	10
Germany	1	2	3	4	5	6	7	8	9	10
Poland	1	2	3	4	5	6	7	8	9	10
Russia	1	2	3	4	5	6	7	8	9	10
United States	1	2	3	4	5	6	7	8	9	10

Which side would you like to see win the war?

Allies.
Germany.
Neither side (or don't know).

SUBJECTS

The subjects were 226 students in elementary psychology and "night school" courses. To rank the subjects according to their attitudes, each possible response to the items of the attitude test was given a value on this scale: Strongly Pro-Ally, Mildly Pro-Ally, Undecided, Mildly Pro-German, Strongly Pro-German. A stencil was constructed for every item, indicating

the scale-value for each possible response. Each of the eight stencils was applied to every questionnaire and the values tallied on the questionnaire. Then the tallies were given arbitrary indices of attitude: SPG tallies $= -2$, MPG tallies $= -1$, Undecided $= 0$, MPA $= +1$, SPA $= +2$. For each questionnaire the tallies were multiplied by their arbitrary indices, yielding a total product, ranging from -16 to $+16$, which served as an index of attitude.

The papers were then ranked according to this index of attitude and a frequency distribution made of these rankings. Inspection of this frequency distribution disclosed the fact that the distribution tended to be slightly multimodal in character, with the index of attitude ascending somewhat step-wise. Especially at the lower end of the distribution there is a definite grouping of the scores.

TABLE I

ATTITUDE-GROUPS

GROUP	DESIGNATION	N=	ATTITUDE INDEX
I	Strongly Pro-German (SPG)	12	—16 to —11
II	Mildly Pro-German (MPG)	18	—10 to — 5
III	Neutral$_1$ (N_1)	42	— 4 to 0
IV	Neutral$_2$ (N_2)	58	+ 1 to + 5
V	Mildly Pro-Ally (MPA)	56	+ 6 to +10
VI	Strongly Pro-Ally (SPA)	40	+11 to +16

Since it was desirable to be able to divide the total group into sub-groups of varying attitudes, advantage was taken of the multimodal character of the distribution as an aid in effecting this separation. It was originally expected that perhaps three groups could be selected, but the nature of the distribution seemed to permit of finer division. By establishing the limits of the class-intervals at the low points on the curve, six roughly clustered sub-groups were derived. The mean attitude value of the total group was found to be $+3.14$ ($\sigma = 7.08$). The designations of the sub-groups, their attitude values and the number of cases within each group are shown in Table I (above).

RESULTS

As described above, the questionnaires were scored according to the "pro-Ally" interpretation of each statement. The score for each individual is thus the number of pro-Ally interpretations of rumors which he

accepts as True or Probable.[45] For the total group of 226 subjects, the mean number of pro-Ally interpretations for the 25 items was found to be 13.13 ($\sigma = 4.64$). Split-half reliability for the test is: $.81 \pm .016$.

TABLE II

ATTITUDE AND ACCEPTANCE OF PRO-ALLY PROPAGANDA

GROUP	ATTITUDE INDEX	N=	RUMORS BELIEVED		
			NO.	MEAN	σ
I SPG	—16 : —11	12	50	4.2	2.46
II MPG	—10 : — 5	18	132	7.3	2.42
III N_1	— 4 : 0	42	459	10.9	3.50
IV N_2	+ 1 : + 5	58	783	13.3	3.16
V MPA	+ 6 : +10	56	814	14.5	2.73
VI SPA	+11 : +16	40	728	18.2	2.88

The mean number of pro-Ally items accepted by each group is shown in the above table.

These results indicate a rather close relation between attitude and acceptance of propaganda. Viewing the statements from their pro-Ally interpretation, we find that as strength of pro-Ally attitude increases, the acceptance of pro-Ally propaganda increases. The group displaying strongly pro-German attitude accepts a mean of only 4.2 out of 25 pro-Ally suggestions, those of mildly pro-German attitude accept 7.3 items, the groups of relatively neutral attitude accept 10.9 and 13.3 respectively, while the mildly pro-Ally group believes a mean of 14.5 rumors, and the strongly pro-Ally group believes 18.2 rumors favorable to the Allies. Thus, of the extreme groups, those strongly pro-Ally accept more than four times as many items of propaganda favoring this position as do those strongly pro-German.

Differences between the means of these groups are statistically significant in all cases save one. The differences and their critical ratios are shown in Table III. The critical ratios of the differences all attain the accepted criterion of statistical significance, save for the difference between group IV and group V. The C.R. of 2.17 for this group, however, indicates 98.6 chances in 100 of a true difference.

Finally, to get the most adequate quantitative measure of the association between attitude and acceptance of propaganda, the Pearsonian correlation coefficient was computed. The product-moment r between attitude and acceptance is $.797 \pm .016$.

[45] Scores for pro-German acceptances would, of course, equal (25 minus the PA score).

It may be noted in Table II or III that the standard deviations of the Neutral groups are larger than the sigmas of the more extreme groups. Is there the possibility that groups of more extreme or more "decided" opinion are more consistent in their acceptance and rejection of sugges-

TABLE III

SIGNIFICANCE OF DIFFERENCES BETWEEN GROUPS

GROUP	M	σ	σ_M	DIFF. M_1-M_2	$\sigma_{Diff.}$	C.R.
I SPG	4.2	2.46	.743			
				3.1	.947	3.33
II MPG	7.3	2.42	.588			
				3.6	.798	4.47
III N_1	10.9	3.50	.540			
				2.4	.683	3.51
IV N_2	13.3	3.16	.415			
				1.2	.553	2.17
V MPA	14.5	2.73	.364			
				3.7	.583	6.35
VI SPA	18.2	2.88	.455			

tions? Is there likely to be more variability in the responses of relatively "undecided" groups?

A comparison was first made of the variability within gross divisions of

TABLE IV

VARIABILITY WITHIN MAJOR GROUPS

GROUP	ATTITUDE INDEX	N=	MEAN RUMORS	σ	DIFF. $\sigma_1-\sigma_2$	C.R.	CHANCES IN 100
PG	−16 : −5	30	5.7	3.02			
					.46	.995	84
N	−4 : +5	100	12.5	3.48			
					.27	.802	79
PA	+6 : +16	96	16.3	3.19			

the total group of subjects. By pairing the six sub-groups, three major groups were derived. The two pro-German groups (SPG and MPG) were combined to form a pro-German (PG) group; the two neutral groups (N_1 and N_2) form one Neutral (N) group; the two pro-Ally groups (MPA and SPA) form one pro-Ally (PA) group. Comparing the Neutral group with the groups of more extreme opinion (PG and PA) we find a slight but not significant difference in variability. The neutral group tends to be less consistent in acceptance of rumors. This is shown in Table IV.

Thus, when subjects are grouped into only three classes, there is little significant difference in variability. However, if three of the six sub-groups are compared, the differences in variability are in the same direction but are more nearly significant. In Table V is shown the comparison between one of the "undecided" sub-groups (N_1) and the two most extreme attitude groups (SPG and SPA). In more widely separated groups, there

TABLE V

VARIABILITY WITHIN SUB-GROUPS

GROUP	σ	DIFF. $\sigma_1-\sigma_2$	C.R.	CHANCES IN 100
SPG	2.46	1.04	1.61	94
N_1	3.50	.62	1.29	90
SPA	2.88			

appears to be some tendency (about 9 cases in 10) for the groups of more decided opinion to be more consistent in their acceptance of suggestions than groups of undecided opinion.

Part B

Russo-Finnish Propaganda

Some little check on these results was afforded by the inclusion in the questionnaire of seven additional propaganda-items relating to the Russo-Finnish war, which was in progress at the time of administration.

METHOD

These rumors were scored according to the technique described above. A score was given each paper in terms of the number of acceptances (True or Probable) of pro-Finnish interpretations of the items. The seven items and the "pro-Finnish" interpretation of each appear below:

Mutiny is under way and spreading in the Russian Army facing Finland. Russian planes have bombed and machine-gunned their own soldiers. There has been severe fighting between the Soviet officers and infantry. (True)

The Finns, brave and heroic as they are, can't go on forever:—numbers must win in the end—for the Russians. (False)

Russia has no ambitions to Sovietize Finland. Her only aim is to free

Finland from a gang of oppressive war-mongers and to insure the perpetuation of democratic processes. (False)

So valiant have been the Finns in fighting for their country that it is not uncommon for Finnish soldiers single-handed to have slain Russians by the score, and in one day nine Finnish soldiers destroyed 730 Russians. (True)

The Russian soldiers have no gloves and only thin shoes and shoddy cotton uniforms for the subzero Finnish temperatures, though the Government has been telling civilians that they must put up with a scarcity of clothing themselves so that the defenders of revolution might lack nothing. (True)

TABLE VI

ATTITUDE AND ACCEPTANCE OF PRO-FINNISH PROPAGANDA

ATTITUDE		RUMORS ACCEPTED		
GROUP	N=	No.	MEAN	%
I Pro-Finnish	74	357	4.83	69.0
II Undecided	121	407	3.36	48.0
III Pro-Russian	31	37	1.19	17.0

Handicapped by the loss of many of its most able political and military leaders through vicious "party purges," aggravated by the unexpected and dismaying failure of what was to have been a ten-day Blitzkrieg against Finland, and faced with mutiny of many of the troops and the rapidly spreading dissatisfaction on the part of the civilian population, Stalin's government in Russia is in imminent danger of revolution and overthrow. (True)

Latest reports indicate that nearly as much of Russia is occupied by Finland as there is of Finland occupied by Russia. (True)

The subjects were divided into three attitude-groups on the basis of their statements of degree of "liking" (on a scale from 1 to 10) for Finland and for Russia. Individuals who placed Finland four or more degrees above Russia were classed as "pro-Finnish." Those placing Russia four or more degrees above Finland were considered "pro-Russian." If Finland and Russia were placed within three degrees of each other the attitude was considered "Undecided."

RESULTS

The percentages of pro-Finnish interpretations accepted by each of the three attitude-groups are indicated in Table VI (above).

These results are in accord with those of the more extensive investigation

of pro-Ally propagandas. Acceptance of propaganda is closely related to attitude. The pro-Finnish group accepts a mean of 4.83 out of 7 pro-Finnish suggestions (69 per cent), the Undecided group accepts approximately half of the suggestions (3.36 or 48 per cent), while the pro-Russian group rejects all save a mean of 1.19 out of 7 pro-Finnish suggestions (17 per cent). Thus, the pro-Finnish group accepts more than 4 times as many pro-Finnish suggestions as does the group of pro-Russian attitude. These findings, while inconclusive in themselves, lend added support to our previous results.

Part C

Information and Suggestibility

PROBLEM

One of the important conditions considered productive of non-suggestibility is thought to be knowledge or information. An individual is thought less likely to be suggestible in areas in which he has a store of relevant knowledge or information (*e.g.*, 3). Cantril (27), however, found that special knowledge of a field did not result in notable resistance to suggestions within this field. Hence we took the opportunity in this experiment to make a brief investigation of this factor in suggestion. Is there a demonstrable relation between suggestibility and acquaintance with relevant factual material?

MATERIALS

Interspersed among the propaganda items were ten questions testing general knowledge of military affairs. The questions for the information test were selected from sources of military discussion which were thought to be available to the subjects, such as the Military Affairs departments of *Time* and *Life* magazines. They consisted of matters of fact or matters upon which the journalistic "military authorities" maintained substantial agreement. It was hoped that such a series of questions would permit ranking of the subjects as to their familiarity with current military fact and opinion. The following questions, of various levels of difficulty, were used for this purpose:

The Siegfried Line is of what sort of construction?

Solid, continuous concrete fortification.

A series of spaced, unconnected fortified positions and independent forts.

To increase their power to damage, "magnetic" mines are so constructed that they are drawn bodily to the victim's steel hull by their own magnetism.

Military experts for the most part still believe that the basic and probably decisive fighting of the war will be done by the infantryman.

Most military observers and experts believe that the decision of the present war will be reached in a matter of 72 hours, a true air war.

Naval experts consider the British Navy large enough to defeat any two European navies.

Which nation's bombers have the greatest load-capacity, range and speed?
Germany.
Britain.
France.

Particularly as regards its infantry, the French Army is considered by military experts the strongest all-around fighting machine in Europe.

Which nation is prepared to replace its planes most rapidly?
Germany.
England.
France.
Russia.
United States.

The most effective weapon now being used to combat air raids is a secret magnetic device so strong that it jerks all the steel parts out of an approaching enemy airship, causing it to crumple and crash.

Fundamentally, the core of air attack lies in the pursuit ship.

RESULTS

In scoring the information-test account was taken of partially correct answers (*e.g.*, Probable, where correct answer is True) by assigning them one point of credit, while completely correct responses received two points. The total score possible was thus 20 points. The range of scores was from 3 to 20, with the mean falling at 9.4 ($\sigma = 3.36$).

It was desired to divide the total group into sub-groups of varying degrees of information, in order to ascertain whether such groups would accept differing numbers of rumors. To achieve groups as nearly as possible equal in size, the limits were established as shown in Table VII.

This table indicates the scores of the five knowledge groups, the number of cases in each group and the mean and standard deviation of pro-Ally rumors accepted by each group. From an inspection of the means it is evident that there is little variation between the knowledge groups in the number of propaganda items accepted. The magnitudes of the standard deviations indicate that there is greater variability within the groups than

between the groups. Groups displaying given amounts of information do not seem to be characterized by specific "degrees" of suggestibility to a given type of propaganda.[46]

The product-moment correlation of information and acceptance of pro-Ally propaganda confirms this finding. The Pearsonian r for knowledge and acceptance $= -.102 \pm .044$. This value sustains the negative relationship expected on *a priori* grounds, but its value is lower than was anticipated.

TABLE VII

KNOWLEDGE AND ACCEPTANCE OF PROPAGANDA

INFORMATION SCORE	N=	PA RUMORS ACCEPTED MEAN	PA RUMORS ACCEPTED σ	PF RUMORS ACCEPTED MEAN
3–6	48	12.69	5.53	3.40
7–8	46	13.41	4.74	3.54
9–10	58	14.13	4.78	3.80
11–13	42	12.95	4.32	3.50
14–20	32	12.03	3.59	3.24

Upon inspection, the regression line of "belief in rumors" upon "knowledge" seemed to be curvilinear rather than rectilinear. This tendency is also reflected in the figures of Table VII. The group evidencing the greatest mean acceptance of pro-Ally propaganda is the group of medium knowledge (9–10), while groups at the extremes of the knowledge scale (3–6 and 14–20) accept the fewest rumors. The same tendency is noted in the acceptance of pro-Finnish rumors. This result was somewhat surprising, indicating apparently that groups of intermediate knowledge were more suggestible than groups of the least knowledge.

Testing for the reliability of the differences between the intermediate and the two extreme groups, we find that the differences fall short of statistical significance (Table VIII).

Since there remained some possibility (9 chances in 10) of these differances being significant, a new correlation between knowledge and belief was calculated, on the assumption of non-linearity of regression. This new correlation (the correlation ratio, *eta*) was found to be *.16,* and when corrected by Pearson's formula for correcting for fine grouping, was increased to *.26.* $\pm$ *.042.*

[46] In view of the findings of the succeeding experiment (Chapter IV), some doubt is cast upon the validity of the information-test employed here; results of its application are taken with reserve.

This indicated a closer degree of relation than that expressed by the original correlation ($r = -.102$), so the zeta test for linearity of regression was applied. The critical ratio for the zeta test was found to be 1.76. While this is not statistically significant there remain 88 chances in 100 of true non-linearity.

In a further effort to check this question, Blakeman's test for linearity [$N(\eta^2-r^2) < 11.37 =$ linear] was applied. The result, 5.57, is less than the required 11.37, and indicates the probability of a linear relationship.[47]

TABLE VIII

SIGNIFICANCE OF DIFFERENCES IN SUGGESTIBILITY

KNOWLEDGE GROUP	N=	M	σ_M	DIFF. M_1-M_2	C.R.	CHANCES IN 100
3–6	48	12.69	.799			
				1.44	1.48	93
9–10	58	14.13	.628			
				2.10	2.36	99
14–20	32	12.03	.635			

SUMMARY OF RESULTS

I. The results of this investigation lead to the conclusion (in harmony with findings of previous experimenters) that the acceptance of propaganda is closely related to attitude. Among individuals of widely varying attitude toward a social situation, their acceptance of propagandas concerning the situation varied with their attitudes. Individuals expressing similar attitudes may be grouped together and the groups may be characterized as being "suggestible" to specific propagandas and "unsuggestible" or negatively suggestible to other specific propagandas. The evidence, summarized:

(1) On the basis of an attitude-test we were able to divide the subjects into six attitude groups (Table I). As strength of pro-Ally attitude increases, acceptance of pro-Ally propaganda increases. As pro-German attitude increases, acceptance of pro-German propaganda increases. The strongly pro-Ally group accepts over four times as many pro-Ally rumors as does the strongly pro-German group. Neutral groups accept an intermediate number of both propagandas (Table II).

[47] However, the values for these tests of linearity are not of decisive magnitude. There may remain the interesting possibility that the relationship between knowledge and suggestibility is not a direct linear relation. Perhaps suggestibility may not vary inversely with knowledge, but inversely with *deviation* from some mean amount of knowledge. This possibility presents an interesting question for further test.

The differences between these groups are statistically significant (Table III).

The Pearsonian correlation between attitude and acceptance is $.797 \pm .016$.

(2) There is some possibility (9 chances in 10) that groups of more extreme attitude are more consistently suggestible to a given type of propaganda than are groups of undecided or intermediate attitudes (Table V).

(3) Corroboration of these findings was obtained with a short Russo-Finnish questionnaire. The pro-Finnish group accepted four times as many pro-Finnish rumors as did the pro-Russian group, while the Undecided group again accepts approximately half the items (Table VI).

II. Though the extent of relationship is not great, suggestibility appears to be negatively associated with knowledge or information.

Among groups of varying knowledge of military affairs there are slight differences in acceptance of pro-Ally and pro-Finnish propaganda. Groups of median knowledge accept more rumors than the groups of either most or least knowledge (Table VII).

These differences approach but do not achieve statistical significance (Table VIII).

The product-moment correlation between information and acceptance of pro-Ally propaganda is $r = -.102 \pm .044$.

The correlation ratio was found to be .16. Corrected for fine grouping, this is increased to .26.

While the zeta test and Blakeman's test for linearity of regression favor the probability of a linear relationship between knowledge and acceptance, the values are not of unequivocal magnitude.

CHAPTER IV

SITUATIONAL CONDITIONS OF SUGGESTION: THE RORSCHACH INKBLOT TEST

Introduction [48]

THE second, and perhaps more significant, aspect of our investigation is concerned with an exploration of certain characteristics of the stimulus-situation within which the process of suggestion is found to operate. We have especial reference here to the factor of *ambiguity* of the stimulus-situation. A wide variety of stimuli have been employed by experimenters in studying suggestion, but it remained for Muzafer Sherif to conceptualize what may prove to be one of the basic determinants of suggestibility, the "structuration" of the stimulus. Following the observations of Wertheimer and others, Sherif emphasizes the rôle of organization or structuration of stimuli.

"There are cases in which the external field of social stimulation is well structured. . . . The field of stimulation is organized into definite structures, the rest forming the background on which these structures stand out with figure-character. In the organization of response to stimulation the essential principle is the *grouping* of different parts of the stimulus field.

". . . In cases where such objective factors are wanting, the result is usually not a perception of chaos. Organization still takes place. But in the latter cases the internal factors play the dominant rôle in organization or grouping. These internal factors may be attitude, set, drive, emotional state, etc." [49] (120, *pp. 48–49.*)

Thus, Sherif recognizes both "external structuration," where there is definite organization of the stimulus field; and "internal structuration,"

[48] This section may be considered as introductory not only to the present chapter, but to the two succeeding chapters.

[49] An experiment by Stephens (130) nicely confirms this last statement. S was to hit a concealed target. Success would be indicated by a bright light, failure by a dim light. S was to announce "right" or "wrong," according to the light-intensity. Since the difference in brightness was not very marked, "S had a chance to err in his interpretation" of the signal. There were only 9 cases in which the Ss interpreted a bright light as meaning "wrong," and 417 instances in which they interpreted a dim light as meaning "right." "A disparity of this size suggests that . . . the Ss are prone to interpret an ambiguous signal to their own advantage." In another case, Ss were allowed to score their own examination-papers, according to an answer-sheet employing ambiguous symbols for "right" and "wrong." ". . . When an S is asked to judge whether his response is right or wrong, and when the key by which he judges his responses is ambiguous, then he tends to call his response correct."

where organization is the product of attitude or set. The experiment reported in the preceding chapter may be regarded as an investigation of the factor of "internal structuration" in suggestion. The experiments to be reported in the remaining chapters are directed, in the main, toward the problem of "external structuration" as it conditions suggestibility.

Sherif himself (119) has provided us with "well-nigh classical" (59) studies of the formation of norms through the operation of suggestion in unstructured situations. When one individual, in the autokinetic situation, distributed his judgments of "movement" of the light around a pre-arranged norm, other members of the group were found to give judgments clustered about this norm. The influence of this suggested norm was evidenced not only during the original suggestion-situations, but even in later sessions when the suggestor was not present.

A number of investigations concerned primarily with other objectives yield results which may be interpreted as reflecting the influence of ambiguity. The influence of suggestion in esthetic judgments has been tested by the use of materials which are frequently so complex as to be relatively ambiguous under the experimental conditions employed. *E.g.*, involved musical selections (27, 129), passages of poetry (27, 118), pictorial compositions (43, 44, 126): it is perhaps not unlikely that the suggestibility demonstrated in judgments of such stimuli may have been contributed to in part by a factor of ambiguity or lack of clear structuration of the stimulus. However, since no explicit account is taken of this possibility, such an interpretation must remain hypothetical.

We have more definite evidence for interpretation of the results of studies of suggestion in judgments of facial expression. The data of Fernberger (46) and of Jarden and Fernberger (67) show that certain facial expressions receive more unanimous recognition from the subjects than do other expressions. These commonly recognized expressions are less influenced by suggestion than are those not so well recognized. If we may adduce the frequency of correct recognition as evidence for the degree of ambiguity of certain expressions, it seems to follow that the more ambiguous stimuli were more open to suggestion, and less ambiguous stimuli were less susceptible to suggestion. If this interpretation of the data is permissible, it would seem as though Sherif has provided us with concepts which emphasize significant aspects of the findings, aspects not pointed out in the original conclusions from these data.

The investigations noted above do not expressly refer to a factor of ambiguity as influential in the results obtained. There are, however, a few experiments in which this element is explicitly recognized. McGregor (85) and Cantril (29) both emphasize the rôle of ambiguity in situations where the prediction of future events conforms to pre-existing attitudes. Woodworth and Sells (154) point out the factor of ambiguity and difficulty of syllogisms as operating toward the acceptance of invalid conclusions in a syllogism test. "Differences in difficulty," arising from "the ambiguity of the language in which syllogisms are expressed," seem to make for

greater influence of the "atmosphere effect." "When the subject does not *see* the relationships clearly, he is influenced by the atmosphere of the premise. . . ."

Chapman and Volkmann (34) compared the efficacy of prestige suggestion where the "frame of reference" was "determinate" (previous experience with the task and knowledge of previous scores) or "indeterminate" (no previous experience with the task), finding suggestion more effective in the ambiguous situation. The studies of judgment and attitude by Asch, Lewis and Hertzmann (3, 4, 75) employ a 'prestige suggestion' technique in situations "which were objectively ill-structured and vague." They found that in such situations, "a standard having an authoritative source tends to alter an individual's judgment in its direction" (3, *p. 251*), but that a "conflicting" standard may be ineffective, and that when the subject has some objective knowledge of a situation this may produce a more stable attitude and one more resistant to change.[50]

PURPOSE

The present experiment raises the question of the suggestibility of complex perceptual responses to ambiguous stimuli.[51] It has frequently been shown that subjects will agree to a suggested description of a situation, when the description is verbalized by the suggestor himself. They will assent to a statement or "leading question." But can response to perceptual data be suggestively influenced beyond a point of passive *assent?* Can suggestion direct the subjects' *own* verbalizations? Can we influence the subject actively to construct the situation in accordance with suggestion rather than simply *accepting* an imposed construction? Moreover, will the subject interpret the situation according to any and every suggestion offered, or is his interpretation demonstrably related to existing attitudes not specifically associated with the given stimulus-situation?

These are the questions around which the following experiment is organized. The material chosen for the experiment was the Rorschach Inkblot Test, which offers for judgment stimuli of intentional ambiguity.

Whipple included a series of inkblots of his own construction in his *Manual of Mental and Physical Tests* (147). These have been used by

[50] It should be noted that Asch (4) specifically challenges the interpretation of his results according to "a hypothetical factor of suggestion, imitation or prestige" (*p. 457*). He holds that the influential standards "have not worked *directly* upon the individual's judgments or upon his 'responses' by virtue of their suggestiveness or prestige, but that their action is confined to the definition of the object of the judgment. . . . The primary process is the alteration of the stimulus-field, of its meaning, from which further changes follow." Though this interpretation would appear to oppose an 'ideomotor' theory of suggestion, it might not be so incompatible with Doob's theory that "suggestion results from the manipulation of stimulus-situations in such a way that . . . there occurs within the mental field a new integration . . ." (39, *p. 54*).

[51] This experiment was reported in briefer form at the 1939 spring meetings of the Eastern Psychological Association, at Bryn Mawr College, Bryn Mawr, Pennsylvania.

experimenters who employed Whipple's battery of suggestion-tests, but usually the findings on the inkblots are not separately described. The results are simply averaged with the scores on the other tests of suggestibility, and the whole presented as a "suggestibility-score." Otis (97) also used inkblots in her battery of tests, but again the results are lumped with scores on the total battery. Brown, Feingold, R. S. White and Sarbin are among the few experimenters who report in specific detail their findings on inkblot tests.

Among his many experiments, Brown (26) includes a test employing the Whipple blot number 7. A "covert reference" to "animals" was inserted in the directions for viewing the blot: "This particular blot may make you think of some kind of animal, or of any number of things." This guarded suggestion seems to have had little effect on responses to the blot. Under suggestion, 31.1 per cent of the "ideas" were animals; 29.8 per cent were animals, "without suggestion." Feingold (45) investigated the control exercised upon "fertility of imagination" by viewing picture postcards before responding to inkblots. He used five of the Whipple blots. Out of 57 trials, 14 judgments (24.5 per cent) bore a relation to the picture postcards seen immediately before.[52] Working with 16 children, Roberta White (149) employed suggestive questioning to influence responses to 10 Whipple inkblots. Only one question was employed for each blot: "Is it a girl (policeman, rabbit, snake, etc.)"? In two situations, the average acceptance-scores were 3.3 (control-test first, suggestion-test later), and 5.8 (suggestion-test first). Out of a possible 200, 116 suggestions were accepted.

The most novel and interesting experiment is that of Sarbin (107). He was interested in the changes in personality which occur under hypnosis, and used as his tool for measuring personality the Rorschach Inkblot Test. The procedure involved hypnotizing the subject and suggesting to her that she was Madame Curie (the next day, Mae West), then giving her the Rorschach test and comparing her responses under the influence of suggestion with her responses in the waking state and under hypnosis without further suggestion. The responses were scored in the standard manner. He finds a number of differentiating factors in the psychograms. "Most of the differentiating scores can be explained in terms of the Aufgabe which the subject imposed on herself following the suggestion. The Aufgabe

[52] In another test, recourse was had to suggestion-stimuli that were "extremely particularized and concrete in nature" (pictures of merchandise cut out of a trade journal), none of which had appeared in the previous responses to the blots. Out of 30 trials with these stimuli, "in only two instances was there partial correspondence between the object imagined in the inkblot and the figure seen immediately before." The observers declared unequivocally that the figures were too concrete, that they imparted no meaning outside of themselves.

serves as a selective factor so that when the blot is perceived, the subject 'looks for something.'" This is shown in the content of the responses. When the subject was told that she was Madame Curie, 21 out of her 40 responses were "scientific" (bunsen burners, thermometers, test tubes, etc.). "She introcepted the suggestion . . . and actively searched for or responded only to forms which would fit into a 'scientific' or 'chemical' Aufgabe." "In the same way, when she accepted the suggestion that she was Mae West, the Aufgabe was 'costume,'" and 66 per cent of her responses were concerned with apparel. ("She described Plate IV as Tarzan and refused to relinquish it. . . .") Not one of her responses in the waking state was associated with the 'scientific' or the 'costume' Aufgabe. Sarbin, though more interested in demonstrating the availability of these tools, the Rorschach test and hypnosis, for the study of personality, draws a conclusion that interest patterns and Aufgaben (both self-imposed and externally-imposed) "may serve as motivational systems" under hypnosis.

PROCEDURE

The present experiment differs somewhat from those cited above, and is more extensive in its scope. Verbal suggestion, rather than Feingold's visual suggestion, was used, but the suggestions were of a more indirect nature than White's questionings, and the investigation was less intensive but more extensive than that of Sarbin. Our general procedure was to obtain the subject's evaluation of a series of common occupations, then to suggest to him that the members of the occupations most preferred by him tend to respond in one manner, and that members of non-preferred occupations respond in a different manner. Then by administering the Rorschach test to the subject himself and examining his own responses, we were able to determine which of the available suggestions the subject had accepted, and their correspondence to his expressed attitudes.

The attitude questionnaire was modified from the one used by Anderson in his study of the occupational attitudes of college men.[53] The subjects were given a list of ten occupations and directed to rank them "in the order of their social standing according to your judgment." The occupations to be ranked were banker, barber, chauffeur, ditch digger, factory worker, lawyer, manufacturer, mechanic, physician and professor.[54] In addition, they were asked to state in which of these occupations they would most

[53] Anderson, W. A. The occupational attitudes of college men. *J. soc. Psychol.*, 1934, **5**, 435–466.

[54] A copy of this questionnaire as it was presented to the subjects appears in the Appendix.

(and in which least) desire to be engaged, what their father's occupation was, and what occupation they planned to enter. One-half of the subjects filled in the attitude scale before viewing the inkblots and one-half received it after the blots.

In administering the suggestions, the following procedure was adopted: the subjects were informed that they were to be given a "personality test" in the form of inkblots. These blots were meaningless in themselves, but an individual could "imagine various things in them," much the way one "sees things in clouds." "On the basis of the sorts of things seen in the blots, it is possible to analyze the individual's personality-type. For example, I have just received a reprint from an outstanding psychologist at Harvard, who reports that men in different occupational standings tend to see different types of things in the inkblots. If what he finds is true, this gives us an important basis for vocational guidance. So part of my purpose in giving you this test is to see if I find the same thing with college students." Then the subject was handed a short article which the experimenter had written and had printed, containing the actual suggestions to which the subject was to be exposed.

This article was printed in such a form as to resemble a standard reprint of a paper in a scientific journal. The page make-up and typography followed the form of short reprints from the *Journal of Abnormal and Social Psychology,* and the page was headed with the impressive though fictitious journal-title, *The Annals of the Academy of the Social Sciences.* Authorship was ascribed to "C. C. Hollingsworth, Harvard University." The article itself consisted of a paragraph of introduction "explaining" the principle and usage of the Rorschach test, followed by the actual suggestion-material. This was presented in the form of the supposed results of the imaginary study being reported in the reprint:

One thousand subjects were selected from various occupations: professional men, including doctors and lawyers; business men, including bankers and executives; skilled laborers; and WPA workers. These men were given the Rorschach Test to determine whether typical differences in interpretation differentiate the various groups from one another. The results show consistent differences between the groups. The group of professional men tended predominantly to view the inkblot as a *whole.* They did not break it down into details, but saw meanings to it as a total picture. The group of business men tended chiefly to see *animals* in the blots. The skilled laborers saw mainly *inanimate* objects. The WPA group tended to analyze the blot into various *details,* viewing it not as a whole but as many separate parts.

There followed a paragraph of meaningless "statistical analysis," designed to convey the authenticity of these findings. At the close, there was a tabular summary of the findings, calling the suggested responses again to the subjects' attention. The subjects, 30 volunteers from the elementary psychology classes, were divided into two groups of 15 subjects each, and the groups given opposite suggestions, in order that by comparison of their results we might determine the effect of the suggestions. Two forms of the article were printed, identical in form and content, with the exception of the suggestions contained. To group I was given the reprint containing suggestions that business and professional men tended to view the blot as a *whole* and that they saw chiefly *animals* in the blots, whereas laborers and WPA workers analyzed the blot into details, and tended to see inanimate objects. Group II was given a reprint with the opposite suggestion, that business and professional men analyzed the blots into *details* and saw mainly *inanimate objects,* while laborers and WPA workers saw the blot as a whole and perceived animal forms.

When the subject had read the reprint, the experimenter showed him a sample blot from the Rorschach series to familiarize him with the material, and then started him on the test-blots. In order to produce a significant number of responses and yet not demand too much of the subjects' time, six of the ten standard Rorschach inkblots were used. An approximate time-limit of five minutes was set for the viewing of each blot.[55] However, if the subject declared he had exhausted his responses before this time had entirely elapsed, he was permitted to proceed with the next blot. The subject sat at ease in a comfortable chair, with the blots on a desk before him. The blots were arranged face-down in a standard order. To control the factor of primacy one-half of the subjects went through the blots in the order from I to VI; the order was reversed for the other half, being from VI to I. The experimenter recorded all responses as they were given, including any incidental comments made by the subject.

SCORING OF RESPONSES

Since we were interested in measuring response to suggestion, rather than in obtaining true psychograms, the responses were scored only for the cate-

[55] That this is ample time to permit of adequate response to the blot is indicated by Thornton and Guilford's finding (137) of a mean time of from 2 to 4 minutes taken for each card by 50 college students. Vernon (141) finds that the majority complete the test in half an hour, though occasionally some may require as much as two and one-half hours. Beck (13) finds the average adult to require 30 minutes, the superior adult, 40 to 60 minutes.

gories which had been suggested in the reprint.[56] Since many of the conventional Rorschach categories commonly yield very few responses each, the scoring was simplified by including only categories which promised to give a substantial number of responses. A further important reason for this procedure lies in the fact that the definition or description of many of the categories is so involved that it would have been difficult to "suggest" them to the subjects without the likelihood of arousing too strongly "critical" an attitude. The complex description necessary to convey the idea would have militated against its ready acceptance. Furthermore, the more involved the description the greater the danger of the suggestion losing force owing to the difficulty of retention over the period of time required for the experiment. This would also have introduced a further variable into the experiment, in the form of individual differences in memory ability. The categories chosen seemed likely to be "meaningful" to and easily retained by the subjects.

Consequently, in the interests of simplicity and effectiveness in suggesting and scoring the responses, it was deemed advisable to limit the items for consideration to two pairs of opposites, whole-responses versus detail responses, and animate versus inanimate objects.[57] The scoring of the Rorschach test is at best somewhat subjective and variable (13, 141). It was felt that the categories selected offered better than average possibility of objectivity and consistency in scoring. These categories, for the purposes of this investigation, were defined in the following manner. "Whole-responses" are responses for which the "whole inkblot" was the stimulus, interpretations referring to the total pattern of the blot. For example, the blots, being bilaterally symmetrical, frequently suggest butterflies, moths, football shoulder-pads, etc. Such images refer to the total pattern of the blot, and are classified as whole-responses. "Detail-responses," on the other hand, are interpretations of specific details within the inkblot.[58] For

[56] "Complete" scoring includes measures of nearly 20 factors, such as total responses, wholes, details, specific types of details, form, movement, chiaroscuro, vulgar, animal and human responses (13, 141). The present scoring is more restricted than the conventional technique, and the results are consequently not susceptible of interpretation in terms of the formal Rorschach "factors."

[57] Vernon's words (141) afford some justification for this choice. Whole versus detail is relatively objective in scoring, "Since it is fairly easy to decide whether or not a response is a *g* [whole]. . . ." The relative frequency of animal responses is also indicated: ". . . the animal interpretations must always be enumerated. Being the commonest kind of answer . . ."

[58] "*Ganzantwort, i.e.,* a response which interprets the blot as a whole. . . . *Detailantwort, i.e.,* a response which interprets some part or detail of the blot." (141, *p.* 99.) In one of the plates, there are tiny 'secondary' spots of ink, not connected to the body of the main blot, much smaller in size and printed in red rather than black ink. In conformity with accepted Rorschach technique (13, 141), "whole-responses" to this blot need not necessarily include reference to these secondary spots.

instance, a certain detail may be seen as a fishhook, the head of a dog, a shoe, etc. Since these images refer to a detail of the blot rather than to the total picture, they are considered detail-responses. In addition, a given response, whether it refers to the whole or to a detail, may represent an image of an animal form, or of an inanimate object.[59] Butterflies, moths or dogs' heads refer to animal forms; fishhooks, shoes and shoulder-pads are inanimate objects. Therefore the category of "animal forms" includes all responses, whether to the whole or part of the blot, which refer to animals or parts of animals. "Inanimate objects" includes all responses, whether to whole or part, which refer to inanimate, non-animal forms.

These definitions cover the great bulk of the responses. There were, however, a few images which "logically" could fit into either the animate or inanimate class. "Pelvic-girdle," for example, may refer to a part of a living organism, or to an inanimate structure of bone. The most satisfactory method of categorizing responses such as this seemed to be to appeal directly to the subject himself. What we were interested in was the correspondence between his responses and the suggestions given him. Since, as stated above, it was thought unwise to attempt too detailed a definition of the categories in giving the suggestions, the subject had a certain leeway in interpreting the meaning of the terms "animate" and "inanimate." To one subject, "skin of animal" might be part of an animal and therefore in the animal class; to another subject, it might be a dead pelt, and "inanimate." Therefore the only adequate means of classifying the response was to ask the subject "what it meant to him."[60]

Accordingly, a preliminary classification of the responses was carried out in coöperation with the subject himself. After he had completed the test, he was asked to indicate what he had "meant" by his responses, with particular reference being made to those which seemed equivocal in classification. By phrasing questions in such a manner as to "draw him out" on the items, it was possible to gain the necessary data without arousing suspicion of the experimenter's objectives. Later, in going over the subjects' records in the course of the final scoring, there were discovered a few

[59] In conventional scoring of the test, "The procedure is to consider each response, first in respect to its 'mode of apperception' [whole versus detail], then its 'quality,' and finally its 'content.' The several categories to which the response belongs are designated by the letters or abbreviations of their German names. . . . Thus when a response has been completely scored it will have received three such symbols." (141, *pp.* 95–96.)

[60] "If the experimenter is dubious, at any time, as to the proper classification of a response, he should mark it with a cross and go through the series again at the end of the experiment, questioning the subject with respect to these doubtful interpretations" (141, *p.* 94). "It is necessary to go back over the record, response by response, and find what portion has been reacted to. . . . In many instances, questioning will indicate the direction of O's thoughts" (13, *pp.* 191, 261).

responses which did not obviously fit into either category, and on which no supplementary data had been secured. One subject, for example, gave two or three interpretations of the "mood" of the blots. "I get the idea of rain, sunshine, grass growing, new life, cheer, happiness, joy, optimism." "The general impression is design, light and flimsy." Another subject remarked, "This blot has an Oriental air to it." In all, there were about a dozen such "unclassifiable" responses. These were not included in the final compilation of scores. Because of their small numbers, and because they were about evenly distributed between the experimental groups, their omission does not materially affect the results. By far the greatest number of items were readily separable into the appropriate classes. "Bat flying," "mountain range," "map," "book open," "two men doing something," "rock formation": these are the common and easily classified interpretations.[61]

The determination of whole-responses versus detail-responses was not difficult. In the experimental period, the experimenter, according to standard procedure, sat behind and slightly to one side of the subject. The subjects, most of whom took a lively interest in the test, in many cases spontaneously indicated the aspects of the blot which suggested their ideas. They would say, "The whole thing looks like a map of a mountain lake," or, "There, that little part reminds me of a witch on a broomstick," pointing to the detail they were regarding. As a result, a great proportion of the responses could be marked W (whole) or P (part) as they were being recorded. For the remainder, the subject was asked at the close of the test to describe the stimulus for his image: "Which aspect of the blot was it that suggested a deer's head to you?" In this, as in the checking of animate versus inanimate responses, the subjects coöperated freely and interestedly.[62]

During the final scoring, all record-sheets were grouped together, with identifying symbols concealed, and each subject's responses tallied on a separate sheet under the appropriate heading, "Whole," "Detail," "Animal," "Inanimate." Since each item could both represent an animate or inanimate object and be a response to the whole or to a detail, every response was tallied twice, once as a whole or detail and once as animate or inani-

[61] In fact, as has been found by other workers with the inkblots, the imagery of different subjects on given blots seems to follow along lines which, in view of the amorphous character of the stimuli, are sometimes surprisingly consistent. The experimenter becomes able, after some experience, to predict in a goodly number of instances the ideas which will be suggested by a certain blot or detail. It is only the occasional subject who consistently produces more than variations on the general theme. In our experimental situation, this tendency is probably augmented, as it was in Sarbin's case, by the nature of the Aufgaben imposed.

[62] "Most subjects seem to evince great interest in the test" (141, *p.* 93).

mate. From these tallies, total individual and group results were derived and percentages computed.

RESULTS

The first requirement is to ascertain the comparability of the two experimental groups with regard to the attitude variable. This is done by determining the average rankings of the various occupations made by each group. As may be seen in Table IX, we find a very close correspondence in these rankings.

TABLE IX

AVERAGE RANKINGS OF OCCUPATIONS

	GROUP I	GROUP II	DIFF.
Physician	2.2	1.7	0.5
Professor	2.5	2.4	0.1
Manufacturer	3.1	4.3	1.2
Lawyer	3.7	3.7	0.0
Banker	3.9	3.1	0.8
Factory worker	6.8	7.4	0.6
Mechanic	7.0	6.7	0.3
Chauffeur	7.7	7.8	0.1
Barber	8.6	8.4	0.2
Ditch digger	9.6	9.7	0.1
Average diff.			0.29

The 'business and professional' occupations are ranked highest in each case, and the 'laborer's' occupations, lowest.[63] The average difference between the rankings of group I and of group II, on a ten-point scale, is only 0.29 points. The closeness of the correspondence is also attested by the rank-difference correlation between the two rankings, rho = .94, P.E. =.024. We may assume then that the two groups are quite comparable with regard to their attitudes toward the occupations mentioned in the reprints read by the subjects. Furthermore, the vocational choices expressed by the subjects themselves lay unanimously, with both groups, in the business or professional fields.

Therefore the effect of the reprint read by group I was to suggest that members of highly-regarded occupational groups (business and professional men) tended to view the inkblots as wholes and to imagine chiefly animal

[63] This ranking is in agreement with those made by Anderson's college students. He found the professions and business occupations heading the list, laborers lower, with ditch digger lowest of all. Katz and Schanck (69), comparing these results with the divergent findings of Davis on ratings made by Russian school children, point out the cultural determination of such occupational evaluations.

forms in the blots. The reprint also suggested that members of non-preferred occupations (laborers and WPA workers) analyzed the blots into details and saw mainly inanimate objects. The suggestions conveyed to group II were the reverse of this, that highly-regarded groups analyzed the blots and saw inanimate objects, while non-preferred groups saw the blots as wholes and imagined animal forms in them.

Table X shows the total number and percentage of whole- and detail-responses and of animal and inanimate objects seen by group I and group II. The total number of responses available for scoring is 1,503, and since each of these is scored in two ways, our percentages are based on approximately 3,000 scorings. Group I gave a total of 744 responses to

TABLE X

GROUP RESPONSES TO RORSCHACH INKBLOTS

GP.	SUGGESTION GIVEN	"WHOLES"		"DETAILS"		"ANIMALS"		"INANIMATE"		TOTAL
		No.	%	No.	%	No.	%	No.	%	
I	Whole-animal	290	39.0	454	61.0	358	48.2	386	51.8	744
II	Detail-inanimate	48	6.2	711	93.8	187	24.6	572	75.4	759
	Differences		32.8		−32.8		23.6		−23.6	

the six blots (omitting 7 "unclassifiable" responses), an average of 49.5 responses per subject; group II gave 759 responses (omitting 6 "unclassifiable" responses), or 51.2 per subject.[64] We find that both groups, as is usual with the Rorschach test, gave more detail-responses than whole-responses. However, group I, which had received the suggestion that business and professional men see wholes, gave 39.0 per cent whole-responses, while group II, who received the "details" suggestion, gave only 6.2 per cent whole-responses; 93.8 per cent of the group II responses were details, only 61.0 per cent of the group I responses were to details.[65] Thus, two groups given different suggestions show a difference of 32.8 per cent in their reports. Again, both groups saw more inanimate objects than animals, but group I, given the suggestion to see animals, reported 48.2 per cent of their responses as animals or parts of animals. Group II, who received the

[64] "Probably an optimum number of about 50 responses from each subject should be aimed at" (141, *p. 98*).

[65] Rough norms for the Rorschach test under standard conditions would seem to be approximately 25 per cent whole-responses and 75 per cent details (13, 141). Thus, the suggestion "wholes" appears to have increased the frequency of this response (39 per cent), and the suggestion "details," to have increased the proportion of detail-responses (93.8 per cent).

TABLE XI

RESPONSES OF GROUP I

(Given "whole" and "animal" suggestion)

SUBJECT	"WHOLES"	"DETAILS"	"ANIMALS"	"INANIMATE"	TOTAL
Be.	6	14	17	3	20
Wi.	4	19	11	12	23
Se.	11	15	12	14	26
Mo.	13	15	15	13	28
Sn.	16	15	13	18	31
Mor.	23	15	28	10	38
Li.	10	30	27	13	40
Ac.	25	15	16	24	40
Sa.	7	40	28	19	47
Ki.	13	47	37	23	60
Hu.	29	46	21	54	75
Bl.	18	58	45	31	76
Ro.	38	38	25	51	76
Ch.	41	36	27	50	77
Hut.	36	51	36	51	87
Totals	290	454	358	386	744*
%	39.0	61.0	48.2	51.8	

* Seven responses in group I were unclassifiable and are omitted from the final scores.

TABLE XII

RESPONSES OF GROUP II

(Given "detail" and "inanimate" suggestion)

SUBJECT	"WHOLES"	"DETAILS"	"ANIMALS"	"INANIMATE"	TOTAL
Ma.	0	21	2	19	21
Co.	2	20	5	17	22
Gl.	2	20	8	14	22
Bu.	1	26	10	17	27
Pa.	6	22	11	17	28
Va.	5	32	10	27	37
Da.	3	42	14	31	45
Th.	4	45	7	42	49
Van.	4	50	8	46	54
Ea.	2	55	28	29	57
Em.	2	70	14	58	72
Be.	4	70	16	58	74
Ma.	4	72	11	65	76
Das.	4	82	23	63	86
Fr.	5	84	20	69	89
Total	48	711	187	572	759*
%	6.2	93.8	24.6	75.4	

* Six responses in group II were unclassifiable and are omitted from the final scores.

suggestion "inanimate," report only 24.6 per cent of their images as animate, while 75.4 per cent are inanimate; only 51.8 per cent of the group I responses are inanimate. The different suggestions produce a difference of 23.6 per cent in the responses. The complete results, in terms of the number of each type of image reported by each individual, are shown in Tables XI and XII.

The differences between the two groups, and the significance of the differences, are shown in Table XIII. The differences between the groups are statistically significant both in regard to wholes versus details (critical ratio = 7.85) and animate versus inanimate objects (critical ratio = 4.13).

TABLE XIII

SIGNIFICANCE OF DIFFERENCES IN NUMBER OF RESPONSES

CATEGORIES AND GROUPS	M	σ_M	DIFF.	C.R.
"Wholes"				
Group I	39.0	3.89	32.8	7.85
Group II	6.2	1.47		
"Details"				
Group I	61.0	3.89	32.8	7.85
Group II	93.8	1.47		
"Animals"				
Group I	48.2	5.00	23.6	4.13
Group II	24.6	2.89		
"Inanimate"				
Group I	51.8	5.00	23.6	4.13
Group II	75.4	2.89		

Since the absolute number of responses given by different individuals varied rather widely in each group (from approximately 20 to nearly 90), it was thought advisable to translate these numbers into percentages and calculate the averages from them. This procedure tends to rule out the possibility of the group results being largely determined by an extreme number of responses on the part of a few individuals. The picture appears very similar when we examine the data in this alternative manner.

TABLE XIV

SIGNIFICANCE OF DIFFERENCES IN PERCENTAGE OF RESPONSES

CATEGORIES AND GROUPS	M%	σ_M	DIFF.	C.R.
"Wholes"				
Group I	38.6	3.77	31.6	7.98
Group II	7.0	1.18		
"Details"				
Group I	61.4	3.77	31.6	7.98
Group II	93.0	1.18		
"Animals"				
Group I	51.4	3.95	25.7	5.38
Group II	25.7	2.68		
"Inanimate"				
Group I	48.6	3.95	25.7	5.38
Group II	74.3	2.68		

Table XIV (above) presents a summary of these results. The figures are obtained by calculating the percentage of each individual's responses which fall into each category and then averaging the percentages of the 15 members of each group.[66]

The differences between group I and group II in terms of averages of the individual percentages are quite comparable to the differences in the absolute numbers of responses, being 31.6 per cent (as compared with 32.8 per cent) for wholes versus details and 25.7 per cent (as compared with 23.6 per cent) for animate versus inanimate. Again these differences are statistically significant (critical ratios $= 7.98$ and 5.38, respectively).

These results lead us to the conclusion that, for groups of college students who rate business and professional occupations highly, the suggestion that such people see animals in the inkblots and view the blots as wholes elicits a significantly greater number of animate and whole-responses than does the suggestion that members of non-preferred occupations make this type of response. But with a group of students of comparable occupational attitudes, the suggestion that members of highly-regarded occupational groups see details and inanimate objects produces a significantly greater

[66] Since a table of individual percentages would reveal approximately the same distributions as those shown for the individuals in Tables XI and XII, these are not repeated here.

number of such responses than does the suggestion that non-preferred occupational groups see details and inanimate objects. Thus, not only can appropriate suggestions influence response to the Rorschach inkblot test, but it is shown that, when alternative suggestions are presented to a given group, those suggestions are accepted which are most nearly in accord with the attitudes of the subjects.

INTROSPECTIVE COMMENTS

These conclusions are substantiated by the spontaneous comments made by the subjects during the course of the test. The subjects all displayed a strong interest in the test (all had volunteered their services).[67] They coöperated fully with the experimenter and talked freely all through the sessions, making a number of "asides" about their reactions to the inkblots. This situation of excellent rapport offered better than usual opportunity to observe the actual operation of the suggestion-process.

An outstanding feature of these spontaneous reports is their evidence for the presence of specific Aufgaben. It will be recalled that Sarbin emphasized this aspect of his own findings on Rorschach patterns under hypnosis. Apparently the suggestion sets up a determining tendency operating upon the observer's perceptual and imaginal processes. This acted to direct the "search." By no means all of the responses are products of the Aufgaben, but in many cases it was clear that deviant responses were of an incidental nature and that the subject regarded as more important those responses which were in line with his determining tendency.

These features are evident in such comments as the following:

(Be., details and inanimate objects suggested) I just *glanced* at the whole. I always looked for *parts*. A couple of them [wholes] struck me just when I picked them up—like the "pelt"—but I *looked* for the parts.

(Th., details and inanimate objects suggested) It's just little pieces of the blot. I can't seem to get anything out of the whole. It's all little pieces I see. . . . I see lots of separate landscapes but nothing from the *whole*.

(Em., details and inanimate objects) I saw lots of *details*. That's mostly what I saw in the blots. And not very many animals.

(Wi., wholes and animals suggested) Once I see them as something big [wholes] it's kind of hard to get anything small [details]. Once you see it

[67] The subjects were insistent in their demand to "know their results." 'Personality-diagnoses,' unfortunately, were never made available to them! But the experimenter obtained the impression that here is a tool over which naïve individuals can get as enthusiastic as over astrology or the crystal ball. Perhaps, in formal usage of this test, it would be wise to make special effort to disabuse observers of their misapprehensions.

as a whole, can you go ahead and pick out slippers, and so forth, or is that seeing it as details?

The experimenter got the impression that, with the group who were given the details-inanimate objects suggestion, whatever whole-responses were given were produced almost involuntarily. They were usually "flash" responses, given almost immediately after the blot was picked up. Then the observers proceeded to analyze the blot into its details. They saw wholes almost in spite of themselves, and frequently reported them in an apologetic or hesitating manner.

(Gl., details and inanimate objects) Said, grudgingly, "Well, from the whole, I suppose . . ."

(Be., details and inanimate objects) Ruefully, "Gee, I can't see anything but animals in this blot."

Several of the comments disclose a definite effort to "see" a particular type of image, and disappointment or distress when this is difficult.

(Hu., wholes and animals) Notice the spots—I want to cover them up and get a whole. . . . It's *hard* to hook the thing up as a whole, because of the different colors.

(Ch., wholes and animals) This is a hard one to do as a whole.

(Se., wholes and animals) I can't make a damn thing out of the whole thing. It's funny—the first ones I made quite a few out of the whole, but since then I've been stuck.

With certain responses which appeared with considerable frequency, it is noteworthy that the *aspect* of the blot serving as the stimulus often varied from one group to the other. Thus, where the "whole" group would see the total blot as an animal rug, the "detail" group frequently saw a *detail* as a rug.

(Th., details suggested) This part looks like a fur rug. (To the other group, the whole blot often looked like a fur rug.) There's a little pelvis. (To the other group, the total blot frequently resembled a pelvis. The word "little" appeared often in this observer's responses, emphasizing the detailed character of what he was reporting: "little antiaircraft guns," "little palm tree.")

(Bu., details suggested) This part looks like an animal skin. (The "whole" group saw the total blot as an animal skin.)

Thus, a given image is suggested to one group by one aspect of the blot, to the other group by a different aspect, according to the suggestions given the two groups. Moreover, the two groups often placed different interpretations upon what "aspect" of the blot they were responding to. As

was mentioned above, one of the blots had two small "secondary" blobs in the corners, unattached to the main blot. Many of the responses to this blot refer only to the main body of it, disregarding the accessory spots. Members of the "whole" group considered such images as whole-responses; members of the "details" group often defined them as detail-responses, and insisted they were not making whole-responses "because they left out those little blots."

Some subjects also had interesting ways of "getting around" an apparent failure to be consistent with their Aufgaben. Many of the blots suggest faces of people. *Ea.* (details and inanimate objects suggested), in these instances reported faces, but saw them as *inanimate*: statues, busts, paintings, etc. Again, when he reported an animal figure, he hastened to analyze it, describing at length the component *details*. Similarly, other members of this group saw inanimate diagrams, drawings or "models" of anatomical parts, where the "animal forms" group saw parts of living organisms (heads, hands, feet, etc.).

SUMMARY

This experiment with ambiguous stimuli has yielded results indicating that subjects may be influenced by suggestion not only passively to accept or assent to a suggested statement, but actively to construct the imaginative situation in accordance with the suggestions given. It has further shown that the subjects do not simply interpret the situation according to any suggestion which may be given, but that the interpretation is selective and is related to attitudinal factors. Both the quantitative data and the introspective comments support the conclusion that those suggestions were accepted which were in accord with pre-existing attitudes and that these suggestions may set up Aufgaben determining the subject's own construction and interpretation of the ambiguous stimulus.

CHAPTER V

DIFFICULTY AND KNOWLEDGE

Problem

CONTINUING the investigation of situational conditions of suggestion, the following experiment is concerned with the factor of complexity or difficulty of the situation to which the subject is required to respond. In what manner will suggestibility vary when individuals are faced with tasks of graded difficulty? Further, the subjective "difficulty" of a task may well be dependent upon the amount of pertinent knowledge or information possessed by the individual. Will we find varying degrees of suggestibility among subjects with different levels of knowledge or training in regard to the task?

Method

The materials of this experiment consisted of sixteen problems in mathematics. The field of mathematics was chosen as affording tasks of graded difficulty; it had the further advantage that the amount of pertinent information or training in this area could be roughly graded according to the number of years a subject had studied mathematics in high school and college.

The problems were chosen, for the most part, from a textbook in college mathematics. Simpler problems were taken from the earlier chapters and more advanced problems from succeeding chapters. To conceal the purpose of the experiment, these problems were mimeographed in booklet form, under the title "Richardson Number Facility Test." This was presented to the subjects as a "mathematical aptitude test," whose authorship was attributed to the mathematics department of another institution.

The suggestions were introduced in the form of "hints" pencilled in the spaces provided for working out the problems. It was "explained" to the subjects that the test had been found to require more time for completion than had been anticipated, so the authors had reduced the labor necessary by giving hints as to the answers or by indicating the first steps in procedure. The hints were inserted in pencil in order to suggest their addition as an afterthought and to render plausible the statement as to their origin and purpose. Later questioning of the subjects revealed that

they accepted without suspicion this explanation of the hints. Most of the hints given suggested incorrect procedures. However, to establish confidence in the suggestions, two of the problems in the first two groups (problems 1 and 2, group I; problems 3 and 4, group II) were given "correct" hints.

The test was given to a preliminary group of 26 subjects. On the basis of their results a few minor changes were made in the formulation of the suggestions, to permit of clearer distinction between "suggestion" responses and "non-suggestion" responses. To increase the "difficulty" of the task, it was found advisable to reduce the time-limit from one hour to thirty minutes.[68]

SUBJECTS

To obtain subjects with varying amounts of information and training, the test was given to classes in elementary psychology and to the mathematics class in differential and integral calculus. From these two sources we obtained groups with a wide range in amount of mathematical training.

For purposes of classification, the subjects were grouped according to the number of years of mathematics studied. One year of high school mathematics was considered as equivalent to one-half year of college mathematics. Thus, if a student stated that he had taken four years of high school mathematics and two years of college mathematics, his "total years of mathematics" would be four years. In defining "elementary mathematics" and "advanced mathematics," three or more years of college mathematics (or the equivalent) were considered "advanced" and less than three years, "elementary."

SCORING OF THE TEST

All papers were scored by two senior majors in mathematics, with the assistance of the Chairman of the Department of Mathematics at Hofstra College.[69] Working independently, these judges classified each response as "suggestion" or "non-suggestion."

The instructions for the test directed the subjects to show on their papers all work done on each problem:

> Do not do the work in your head and just write the answer. There is space provided with each problem on which to do all your figuring. And please do not erase work you have put down; cross it out, if you wish.

[68] A copy of the "Richardson Number Facility Test" appears in the Appendix.

[69] The writer wishes to express his appreciation to Misses Grace Mojzis and Edna Chickray and to Mr. C. E. Stevens, Assistant Professor in Mathematics, for their gracious and valuable assistance in the preparation and scoring of this test.

From the work shown on the papers, the judges were able in most cases to decide whether the student had proceeded according to the method suggested or had rejected the suggestion in favor of his own procedure. The basis for classification was, therefore, the correspondence between the subject's procedure and that suggested by the "hint." "Correctness" of the answer itself was disregarded. However, since most of the suggested procedures were misleading, answers obtained by following the suggested method were usually incorrect. For example, in the problems involving algebra, incorrect equations were pencilled in. If the subject accepted the equations and proceeded to solve them as given, his response was considered "suggestion." If, on the other hand, he rejected the suggested equations and set up his own equations for solution, the response was considered "non-suggestion," regardless of whether his final answer was correct or incorrect.

In compiling the results, account was taken of the agreement of the judges and of the adequacy of the evidence displayed in the "figuring" accompanying each answer. Where the derivation of the subject's paper-work was not clear or where all judges did not agree as to the appropriate classification of a response, the problem was considered as "unclassified." Cases in which the evidence was clear and all judges agreed as to the proper classification were placed in the categories "suggestion" or "non-suggestion."

RESULTS

I. Suggestibility and difficulty of task

Our first question concerns the relation of suggestibility to the difficulty of the task. The problems contained in the test were obviously of varying degrees of difficulty, and it was at first hoped that they could be ranked in these terms by expert judges. Accordingly, the problems were presented to two professors of mathematics. After ranking the problems, these judges expressed the opinion that their own rank-orders might not correspond to the order of difficulty experienced by our undergraduate subjects. Moreover, to the instructors, the problems were of such a simple order that they were not confident of their discriminations.

Therefore, it was thought that a more valid and defensible procedure would be to get measures of difficulty from a population comparable to that tested in the experiment. By presenting the same problems, without the suggestions, and determining the number of students able to solve each problem, we could obtain a valid measure of their difficulty to students of

given levels of mathematical training. The new form of the test, containing the same problems, was identical with the original except for the omission of the suggestions. It was given to comparable groups of students, in two sections of the elementary psychology course and in one section of the calculus course. As with the subjects of the suggestion experiment, the students were divided into an "elementary mathematics" group (less than three years of college mathematics) and an "advanced mathematics" group (three or more years of college mathematics, or the equivalent). The total number of "control" subjects was 71, 47 elementary and 24 advanced

TABLE XV

DIFFICULTY AND SUGGESTIBILITY OF EACH PROBLEM

(In the D columns are shown mean "grade" received on each problem. The S columns show the mean percentage of answers classified as due to suggestion.)

PROBLEMS		ELEM. GP.		ADV. GP.		TOTAL GP.	
GP.	No.	D	S	D	S	D	S
I	1	91	75.9	96	15.0	93	51.0
	2	64	72.4	74	50.0	67	64.0
	3	87	0.0	92	5.3	89	2.1
	4	77	100.0	75	89.5	76	96.0
II	1	91	39.3	91	5.3	93	25.0
	2	98	10.3	100	45.0	99	24.5
	3	72	48.3	83	60.0	76	53.0
	4	38	27.6	72	5.6	50	19.1
III	1	83	6.9	96	10.0	87	8.2
	2	0	96.4	4	90.0	1	93.7
	3	49	75.0	79	35.0	59	58.4
	4	63	71.4	96	33.3	74	52.0
IV	1	18	79.2	63	15.0	33	50.0
	2	52	50.0	86	10.0	63	32.6
	3	11	75.0	53	35.0	25	57.0
	4	4	85.5	18	63.6	8	76.0
Rho, D & S=		.56		.47		.53	

mathematics students. These proportions are roughly comparable with those in the suggestion experiment, in which there were 49 subjects, 29 elementary and 20 advanced mathematics students.

The papers of the control subjects were graded by the regular undergraduate reader in the department of mathematics. Two records of the scores were made: first, the number of students who gave the correct answer for each problem; secondly, the "grade" made on each problem. As in

scoring ordinary examination papers, the reader assigned partial credit for problems correctly begun but uncompleted, or incorrectly completed because of a minor arithmetic error.[70] Since "difficulty" is not an all-or-none phenomenon, it was thought that the relative "grades" on the problems provided a more valid measure of difficulty than the absolute scorings. Hence the measure employed in computing correlations was that obtained by averaging the percentage-score (100 per cent = entirely correct, 0 per cent=complete failure) of all students for each problem. As was expected, the order of difficulty of the problems was somewhat different in the elementary and advanced groups. The rank-difference correlation of these scores was .87. In comparing suggestibility-scores with difficulty-scores, account is taken of this difference by comparing "elementary mathematics" scores with each other and "advanced mathematics" scores with each other.

To discover the relation between suggestibility and difficulty of the task, the difficulty-scores were correlated with the suggestibility-scores. The suggestibility-scores represent the percentage of subjects in each group whose answers, to a given problem, were classified as "suggestion." Since, for different problems, variable numbers of answers were "unclassifiable," the unclassified answers were omitted in computing these percentages. Suggestibility-scores therefore indicate the *proportion of classifiable responses judged to be the result of suggestion.*

Table XV gives a record of the difficulty-score and the suggestibility-score for each problem and for each group of subjects. Since the difficulty-scores are expressed in terms of the mean percentages of correct answers, the more closely the value approaches 100 per cent, the less the difficulty; the more closely the score approaches 0 per cent, the greater the difficulty (*i.e.,* the smaller the number of correct answers).

The rank-difference correlations of these orders are consistently positive, but of only moderate value. For the elementary mathematics groups, the correlation between difficulty and suggestibility is .56, P.E. = .07. For the advanced mathematics groups, the correlation is .47, P.E. = .11. For the entire group, elementary and advanced mathematics together, rho = .53, P.E. = .06. The suggestibility-scores on the preliminary experiment were also correlated with the difficulty-scores of the entire group, which had approximately the same distribution of elementary and advanced mathematics students as did the preliminary group. This correlation is of the same order as the others, rho = .49, P.E. = .10.

[70] For the elementary mathematics groups, the rank-orders of the problems scored in these two ways corresponded exactly. For the advanced mathematics group the rank-orders of two problems were displaced by one point.

The relation of suggestibility to difficulty of the problem is also brought out in Table XVI. The sixteen problems were divided into four "levels of suggestibility," by taking the four problems with the highest suggestibility scores as most suggestible (group 1), the four of next highest score as second in suggestibility (group 2), etc. The difficulty-scores of the corresponding problems were averaged, and these averages are presented in Table XVI, together with the average suggestibility-scores of each group of problems. The results are given separately for the elementary and advanced groups, and for the total group as a whole.

TABLE XVI

RELATIONSHIP BETWEEN SUGGESTIBILITY AND DIFFICULTY OF PROBLEMS

	LEVEL OF SUGGESTIBILITY			
	1	2	3	4
Elementary group				
Percentage suggestibility	11.2	*52.2	76.6	90.3
Percentage correct answers	76.5	69.5	54.0	25.0
Advanced group				
Percentage suggestibility	6.5	15.8	41.2	75.8
Percentage correct answers	88.9	85.2	76.4	45.5
Total group				
Percentage suggestibility	12.5	39.6	59.0	82.4
Percentage correct answers	81.2	70.5	55.1	38.1

It will be seen that, for the elementary group, the control subjects were able to give three times as many correct answers to the four problems which were least suggestible as for the four problems most suggestible. For the advanced group, nearly twice as high a percentage of correct answers was given for the least suggestible problems as for the most suggestible problems. For the entire group, the problems producing least suggestion were again twice as likely to be correctly answered by the control students. In each case, with increasing percentage of suggestion-responses goes increasing difficulty of the problems. This relationship is shown graphically in Figure 2.

Thus we may say that there is a tendency for suggestibility on problems to increase with the difficulty of the problems. Though this relationship is by no means perfect, it appears consistently and to approximately the same degree with groups who have studied little mathematics, with groups

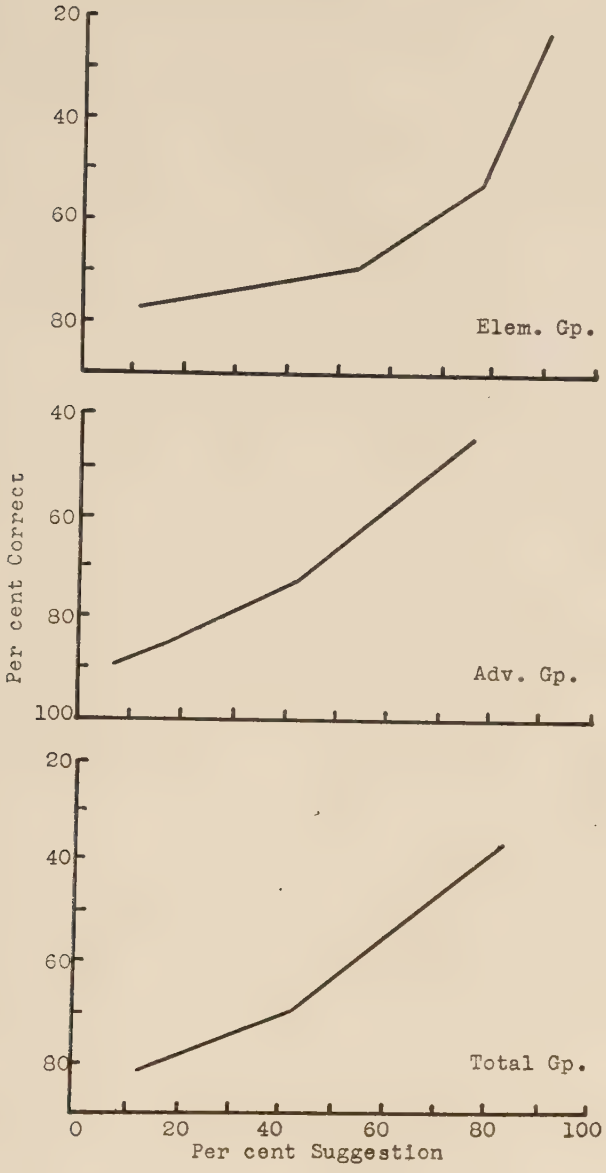

Fig. 2. Difficulty and Suggestibility

Showing relationship between difficulty (percentage correct answers by control groups) and suggestibility of problems, for elementary mathematics, advanced mathematics, and total group.

who are advanced in mathematics, with the two groups taken together, and even with the group given a preliminary test under slightly different conditions.[71]

II. Training and suggestibility

The second phase of this investigation concerns the relation between suggestibility and information or training. Will we find that subjects of varying degrees of training in mathematics display corresponding degrees of suggestibility to the "hints" accompanying the problems?

The subjects were divided into groups according to the number of years of college mathematics they had studied. The range of years of mathematics studied was from 0.5 to 7.5, and it was found that a class-interval of one year of mathematics yielded groups most nearly equal in number of cases. However, owing to the small number of subjects in the upper brackets, the last two intervals were broadened, to encompass a more nearly significant number of cases.

TABLE XVII

RELATION BETWEEN SUGGESTIBILITY AND TRAINING

YEARS OF MATH.	N=	NO. SGN.	% SGN.
0.5–1.25	15	9.1	62.8
1.5–2.25	9	7.4	48.8
2.5–3.25	9	6.3	40.3
3.5–4.75	11	5.2	33.2
5.5–7.50	5	5.4	35.6

Table XVII presents the five groups, of different levels of training, and the mean number and percentage of their answers which were judged to be the product of suggestion. It will be seen that with the exception of the most advanced group, both the number and percentage of suggestion-responses decreases with increasing years of training. The group which has studied less than one and one-half years of mathematics accepted approximately twice as many suggestions as did the groups which have studied three and one-half or more years of mathematics.[72] This relationship is shown graphically in Figure 3.

[71] The relationship might have been yet closer, had it been possible to make the "hints" all of equal plausibility. Of course, one step in this direction would be to make them constant in form. Even barring the difficulty of doing this for various types of problems, however, it is likely that this procedure would invite discovery and therefore reduce completely their effectiveness.

[72] There is a slight increase in suggestibility with the 5.5–7.5 group over the group of 3.5–4.75 years of mathematics. This may be due in part to the smaller number of cases in the more advanced group (5 as against 11 subjects). However, this result is also affected by certain differences in motivation, as will be pointed out below.

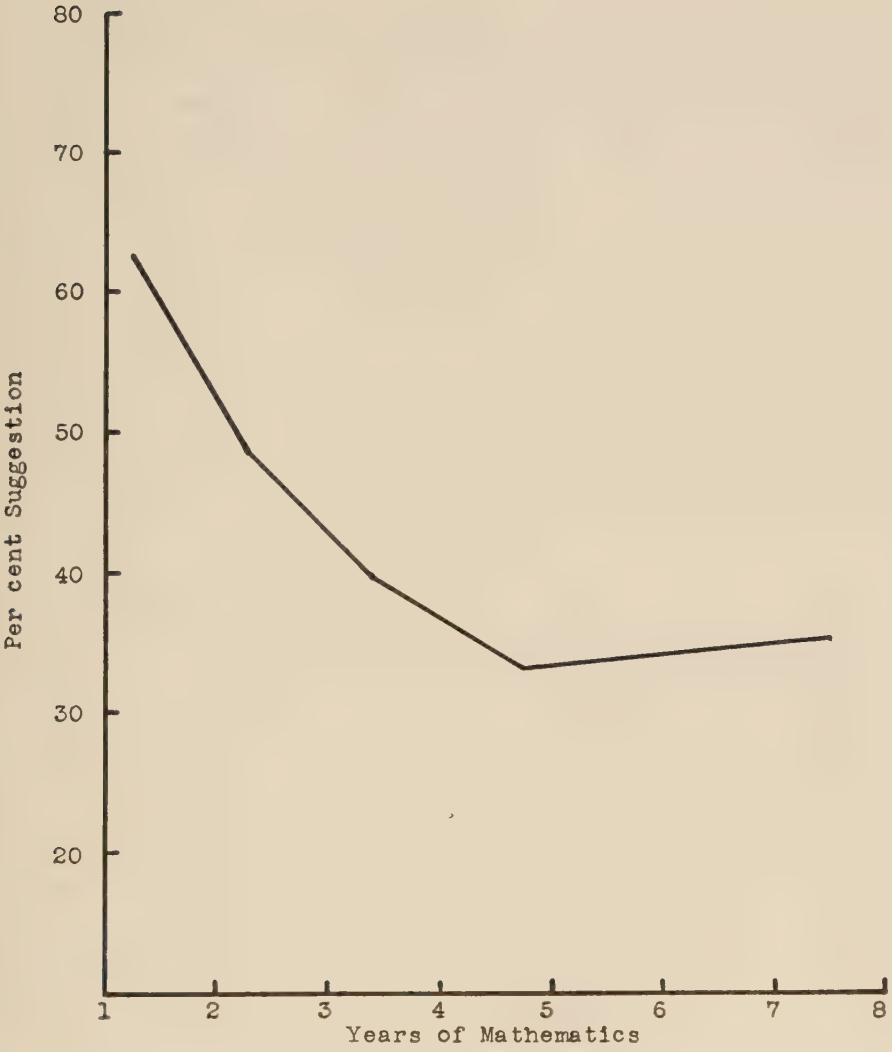

FIG. 3. SUGGESTIBILITY AND TRAINING

Showing the relationship between years of mathematics studied and per cent of answers judged the product of suggestion.

Since it was difficult to find a division of the group which yielded enough categories, with even distribution of cases in each, to permit of correlation by the rank-difference method, resort was had to the method of tetrachoric correlation. The subjects were divided into two major groups, elementary (less than three years of college mathematics) and advanced (three or more years of mathematics). The total number of suggestion and non-suggestion

responses were computed for each group, as shown in Table XVIII. We find that, out of 432 answers, the elementary mathematics group made 252, or 58.5 per cent suggestion-responses. For the advanced mathematics group, only 104 out of 307, or 33.9 per cent, were suggestion-responses. The tetrachoric correlation of the proportions in Table XVIII is $r_t = .39$,

TABLE XVIII

ACCEPTANCES OF SUGGESTION

By Elementary and Advanced Mathematics Groups

GROUP	N=	NUMBER OF PROBLEMS		
		NON-SUGGN.	SUGGN.	UNCLASSIFIED
Elementary math.	29	180	252	32
Advanced math.	20	203	104	13
Totals	49	383	356	45

indicating a rather moderate tendency for resistance to suggestion to be associated with relatively advanced training in mathematics.

The same tendency is evident if we classify the individual subjects themselves as suggestible or non-suggestible, according to the majority of their responses. Table XIX indicates the number and percentage of

TABLE XIX

SUGGESTIBILITY AND NON-SUGGESTIBILITY

Among Individual Subjects

GROUP	SUGGESTIBLE		NON-SUGGESTIBLE	
	No.	%	No.	%
Elementary math.	19	65.5	10	34.5
Advanced math.	2	10.0	18	90.0

subjects in each group who returned a majority of suggestion-responses or of non-suggestion responses. While, in the elementary mathematics group, nearly twice as many subjects were suggestible (19) as were non-suggestible (10), in the advanced mathematics group nine times as many were non-suggestible (18) as were suggestible (2).

These results are in general agreement with those obtained from the preliminary experiment. With the twenty-two elementary mathematics subjects in the preliminary investigation, 55.4 per cent of the responses were influenced by suggestion, while the four advanced mathematics subjects returned only 37.5 per cent suggestion responses. Of the individuals themselves 63.7 per cent of the elementary mathematics group were suggestible in a majority of their responses, and 25 per cent of the advanced mathematics group were thus suggestible.

INTROSPECTIVE REPORTS

By interviewing the subjects soon after the experiment, it was possible to obtain a number of comments which throw some light on why certain individuals accepted or did not accept the suggestions. The pattern of these comments seemed to fit rather well into the classification of reactions found by Cantril in his study *The Invasion from Mars* (31). The presentation of our findings will therefore be made in terms of his analysis.[73]

1. *How the stimulus was experienced* (characteristics of the situation which aroused false standards of judgment). The "test" itself was apparently accepted at its face-value, as a "mathematical aptitude test." No one, either upon presentation of the test or in later comment, questioned the nature or purpose of the test. This reaction was due in part to the formal appearance of the mimeographed booklets, which were made up to resemble standard test-booklets, with blanks for personal information, directions, and an "official" title on the front cover. The explanation of its origin in the mathematics department of a neighboring institution may have detracted from possible suspicion. The prestige of the instructor apparently facilitated its acceptance. These factors compare with Cantril's finding that attitudes toward the radio as the accepted vehicle of communication lent credibility to the Martian broadcast. Cantril also found that the attitude that "nothing was impossible," built up as a result of listening to war news, was important in predisposing toward acceptance. In our situation, the students' attitude that "they were likely to get a test at any time," built up as a result of the many classroom tests which had previously been given (in illustration of mental tests, personality tests, aptitude tests, etc.) predisposed them toward accepting this as "just another one of those tests." Thus, we find similar factors of form of presentation, prestige and

[73] The methodology of our investigation may suggest the feasibility of conducting specific tests, under somewhat more controlled and standardized conditions, of the findings of such field studies as that of Cantril. In the present instance, our results confirm the cogency of the field-analysis in question.

pre-existing attitudes contributing to general suggestibility in both the Martian broadcast and the present suggestion situation. The respective analyses of why individual subjects were suggestible in the two situations are also comparable.

2. *Subjects who checked the stimulus with other information, with external evidence.* Cantril found that about a fifth of the radio listeners interviewed made successful external checks on the broadcast and thereby failed to be suggestible. Successful external checking was more difficult in our situation, where only the experimenter held the key. It so happened, however, that one subject did accidentally complete such a check. After she had taken the test, she chanced into the experimenter's office when he was discussing the test with his colleague. She overheard enough to discover the purpose of the test, and was of course warned not to reveal it to any other students. It then happened that (in making up an absence) she was present at a subsequent class in which the test was again given. It is interesting to note that her suggestibility score on the first test (she was in the elementary mathematics group) was 75 per cent, while it dropped to 31.2 per cent as a result of her "successful check." Of course, her second test was excluded from the compilation of results.

3. *Subjects who attempted an external check, but continued to accept the suggestions.* A portion of the listeners interviewed by Cantril reported attempts at external checks which were not directed at finding out the authenticity of the broadcast, but only concerned the matter of the individual's personal danger. The type of check made for this purpose was characteristically "ineffective and unreliable" (*e.g.,* looking out of the window). Similarly, a number of subjects in our experiment attempted external checks. These commonly took the form of asking the experimenter whether a given hint did not contain a mistake. The questions were not directed at the authenticity of the test as a whole, but only at the accuracy of one or two pencilled hints. Since the experimenter refused to answer any questions, such checks were notably ineffective!

4. *Subjects who successfully analyzed the internal evidence.* Another portion of Cantril's respondents checked or analyzed the internal evidence of the broadcast itself, refusing to believe it on grounds of its impossibility and unreality. Such persons were usually found to be individuals with specific knowledge (of science itself or of the content of "science fiction" stories). Most of the subjects in our experiment who were non-suggestible were individuals who made a successful internal check. "I tried several of the hints and found they were wrong, and thus I ignored them com-

pletely." "I was suspicious because I looked at the hints and discovered some of them were wrong. Therefore I ignored them." "I noticed that some of the hints were wrong. I liked my own way of doing them better, so I didn't follow the hints." As in the case of the radio broadcast, most of these individuals were students who possessed specific knowledge (*i.e.*, were members of the advanced mathematics group).

5. *Subjects who made ineffective internal checks.* A few subjects noted that some hints were incorrect, but for various reasons continued to follow them. "I did not like having to take a math. test, therefore I did not take it seriously. I did notice that some of the hints were wrong but I was indifferent to doing anything about them. I was sick of doing so many tests." Another subject took the test seriously, but explained, "I didn't have much math. and I forgot a lot of what I did know, so I had to take the hints." "I thought the test was awful. It's been so long since I took math. I tried to ignore the hints at the beginning, but toward the end I followed them." "I'm not good at math, and I don't care for it. I looked at the hints and if they seemed better than my way of doing them, I followed them. Otherwise I did the problem my way." "I noticed that some of the hints were wrong, but I thought they were mistakes on the part of the persons who wrote them in."

Two subjects present interesting examples of the influence of motivation on the suggestion process. Both of these individuals had had more than five years of college mathematics, both are majors in physics, and both display, in the classroom and in examinations, a highly critical and intelligent attitude. Yet both were suggestible on the test (their scores were 68.8 per cent and 62.5 per cent, respectively). Discussion with these subjects revealed the fact that their suggestibility was apparently a product of their attitudes toward the test. The first subject, *Wo.*, was suggestible because he was *not concerned* with making a good score and because he gained confidence in the hints from checking the first ones, which were correct.

"I just sat down and did what I had to do. I caught some of the easy ones, but I thought the mistaken hint was a mistake in copying. Toward the last I got careless and figured, if they were wrong, what the hell. Most of the later ones were true I figured. I worked out one and came out with the same answer, so that gave me greater confidence. I figured someone else did the preliminaries and why should I take the trouble, so I went on from there. I didn't care much whether I was right or wrong."

Ma. was suggestible for a different reason. He describes himself as being normally quite skeptical, but as accepting the suggestions because his motive

was to finish rapidly rather than to complete the problems correctly. He was competing with the girl sitting next to him, and it was his aim to finish before she did. The suggestions were therefore accepted as a *means* to this end.

"I was skeptical of the hints—I am of *anyone* else's work on a paper—and I saw an error early in the list. I'm always skeptical of things: if I walk into class and see five figures added up on the board, I always re-do it. I was moderately careful at first. Then, as time became rushed, I let them ride. The last ones I wanted to finish before *Sp.,* so I didn't want to take time to check the accuracy of the formulae. It was a race against her. It was a matter of pride. After while on the hints I thought *I* was wrong—I doubted my own ability. *His* formulas [the hints] should be right, they were part of the test."

These subjects summed up their reactions in these words:

Wo., "I fell for it hook, line and sinker—because my confidence was built up; and torn down a bit, but I didn't care much because it didn't matter. The way my confidence was built up—I'd work out the first part of the formula for myself, and if it was O.K. on the paper, I'd go ahead with those already there. I didn't care."

Ma., "I fell for it for a different reason—because I was so *highly* motivated—to beat *Sp.*"

Thus, there seem to be a variety of factors which may contribute to suggestibility of individuals who had a relatively high degree of knowledge or who had made at least some attempt to check the suggestions. Perhaps a number of these factors may be subsumed under the concept of "ego-involvement." Many of the introspective comments quoted in this section reveal a common element of indifference to success on the test. Because of dislike for mathematics or for tests in general, because the test was not "taken seriously," because "it didn't matter," or because of a desire "to get done before the next person," the objective of these subjects seemed to be quick and painless completion of the test, rather than accuracy in their results. Being more involved in the effort to "get done" than in an effort to be correct, they accepted the suggestions as a ready means to their goal.

6. *Subjects who made no attempt to check.* A large group of Cantril's respondents made no attempt to check the broadcast, but accepted it as presented. So, too, a number of our subjects accepted the suggestions. "I believed that the hints were meant to help us, therefore I didn't check to see if they were right or wrong. I followed as many hints as I could." "I looked at the hints and then followed them because they seemed to be all right. I believed the hints were legitimate and so I took the test

seriously." "I don't know much about math. and I didn't care particularly about the test. I followed the hints because I thought the teacher was sincere enough and really meant the hints to be helpful. I was annoyed at the idea of having to take a math. test." "The hints helped a lot, but if I had had a little more time I wouldn't have followed them so closely, because I really enjoyed math."

These introspective comments aid us in drawing a picture of the factors affecting suggestibility and non-suggestibility in our mathematics experiment. The general situation, as experienced by the subjects, was conducive of suggestibility by virtue of the form of presentation, by prestige and by pre-existing attitudes. The one subject who successfully checked the stimulus with external information showed a marked decrease in suggestibility, but those who made ineffective external checks displayed greater suggestibility. Subjects who possessed appreciable specific information tended successfully to analyze the internal evidence of the test and to be accordingly less suggestible. However, a certain number possessing specific information made only ineffective internal checks. This may be attributed, in at least some cases, to the subject's motivation. These and other subjects who made ineffective checks seem to have been involved with a goal of "completion" rather than "accuracy," and accepted the suggestions as a means to this end. Finally, a number of subjects, for such reasons as ignorance or prestige, made no attempt to check the suggestions, but accepted them as presented.

Summary

We find evidence, in this experiment, of a relationship between suggestibility and difficulty of the task, and between suggestibility and amount of relevant information or training. Measures of these relationships in terms of correlation coefficients, though not high, are consistent from one group to another. The evidence, summarized:

I. The rank-difference correlation between suggestibility and difficulty of the problems was .56 for elementary mathematics students, .47 for advanced mathematics students and .53 for the entire group. A correlation of .49 was also found between suggestibility and difficulty with the preliminary experimental group (Table XV).

When the sixteen problems are arranged in four groups of increasing "suggestibility," it is found that for both elementary and advanced mathematics subjects the mean "difficulty-scores" increase with the mean "suggestibility-scores" (Table XVI, Figure 2).

II. When the subjects were grouped in terms of years of mathematics studied, both the number and the percentage of answers judged as being influenced by suggestion decreased with years of mathematical training. Those who had studied the least amount of mathematics accepted twice as many suggestions as those who had studied the most mathematics (Table XVII, Figure 3).

The tetrachoric correlation between resistance to suggestion and level of training has a value of .39 (Table XVIII).

If we classify the individual subjects as "suggestible" or "non-suggestible" according to the majority of their responses, we find that only 10 per cent of the advanced students are suggestible, but that 65.5 per cent of the elementary students are suggestible (Table XIX).

These results hold, in general, for the preliminary subjects as well as for the subjects of the later experiment.

III. It is found that, on the basis of introspective comments, the reactions to the suggestion-situation are comparable with the analysis of radio listeners' reactions to the broadcast of the *War of the Worlds,* as presented by Cantril. Individuals who made successful external or internal checks tended to be non-suggestible, while persons who made ineffective external or internal checks, or no check whatsoever, tended to be suggestible. Similar factors, in the two suggestion-situations, may be noted as conducive to general suggestibility. Some of the comments also disclosed the fact that suggestibility may be determined in part by the unique motives of the individual. This finding is of course in agreement with our previous experimental findings that suggestibility is often closely related to motives and attitudes.[74]

[74] While we may say, on the basis of these results, that suggestibility is related to difficulty of the task and to amount of training or information of the individual, it does not appear that, in this experiment, the relationship is as close as are the relationships we have previously found between suggestibility and attitudinal factors. It may be noted, however, that the values of the present coefficients of correlation (ranging in the .40's and .50's) are at least comparable with the correlations often found between suggestibility and other personality traits (ranging frequently from the .20's to the .50's).

CHAPTER VI

AMBIGUITY AND SUGGESTIBILITY: TONAL ATTRIBUTES

Purpose

RELATED to the "difficulty" of the task is the degree of "ambiguity" of the situation in which an individual must make a response. Whereas the factor of difficulty is more closely dependent upon knowledge, information or training of the individual, the element of ambiguity may depend more directly upon the stimulus itself. The stimulus to be judged may be clear, definite, unambiguous; or it may be vague, ill-defined, "unstructured." We have shown that suggestibility depends in part upon the degree of difficulty of the problem; will we also find it related to the degree of ambiguity of the stimulus?

The purpose of these experiments on tonal attributes was to set up a situation similar to those commonly employed in experiments on suggestion, and to test not only whether it is *possible* to produce suggestion, but whether certain conditions of the stimuli are more *conducive* to suggestion than are others. We determined upon tone as a stimulus whose attributes might be said to vary in ambiguity. The most frequently recognized attributes of tone are loudness and pitch, and there exists sufficient agreement, as to when a tone is louder or is higher in pitch, to enable us to consider these attributes relatively unambiguous. Tone also has other attributes claimed for it, such as volume and density. But these attributes, to naïve subjects, are likely to seem less clear and certain. Observers judging these attributes commonly require "training" to return consistent judgments on such characteristics, which may indicate that they are somewhat more ambiguous as stimuli than are pitch and loudness. To investigate our problem, we chose one of the unambiguous attributes, pitch, and one of the ambiguous attributes, volume, and arranged an experiment to measure changes in judgments of these attributes under the influence of suggestion.

Most of the standard "ideo-motor" experiments (length of lines, illusion of warmth, of movement, etc.) follow the technique of presenting a stimulus to be judged, inserting a suggestion that it varies in the "wrong" manner; and considering "correct" judgments (those opposite to the suggestion) as non-suggestion or absence of suggestion, and judgments conforming to the suggestion ("incorrect" judgments) as being evidence of suggestion. The

present experiment is patterned after this fashion. The subject was presented with a tonal stimulus for judgment, an "incorrect" suggestion was introduced, and the conformity of his response to the suggestion was measured.

Tones have been used as stimulus-material for suggestion experiments perhaps less than have stimuli in other modalities (compare, for example, the many experiments on visual sensations and perceptions). Warner Brown and A. S. Edwards are almost the only investigators to report specific results of experiments employing tones as stimuli. As a part of his extensive investigation of suggestion, Brown (26) studied the illusory perception of a change in pitch of a tone. Actual changes were first demonstrated and the subjects were then instructed to indicate when they thought a change had occurred, although no change was made. Only 4 per cent of the subjects failed to "hear" the change in two minutes. In this test, no effort was made to suggest a specific direction of change.

Edwards (41), interested in the conscious content of the suggestion process, experimented in somewhat similar manner with pitch. He used as standard stimuli a tone of 870 v.d. from a Stern variator. The "unit of change, up and down" was 2 v.d. He instructed the subjects that they would hear a continuously changing tone and that they were to report as soon as they noticed the change in pitch. The suggestion given before each trial was "Toward the higher" or "Toward the lower." Three observers took part in the experiment. They were inclined to be suspicious of the experiment, and Edwards concludes that "This experiment was not successful." Of 9 judgments, 45 per cent were influenced by the suggestion.

Thus, experiments on suggestion with pitch are equivocal in their findings. So far as we are aware, no one has used judgments of tonal volume in suggestion experiments. Nor has anyone employed pitch in conditions which permitted the subject himself to vary the stimuli. The subjects used by Brown and Edwards exercised no control over the stimuli. In the present experiment, the subjects themselves manipulate the comparison stimulus.

Since we are concerned in this experiment not only with the possibilities of demonstrating suggestion in pitch and volume, but also with the influence of the ambiguity of these attributes upon the suggestive process, it might be well to cite a few arguments in support of the contention that volume is more ambiguous or "unstructured" as an attribute than is pitch.

There is little question raised in the literature, but that the attribute pitch exists, as a definite and elementary attribute. Watt (143) would be the

only one, so far as the author is aware, who would make pitch a subordinate, secondary attribute. Watt would place volume ahead of pitch in primacy. But Watt's theories have been made the subject of disapproval by other psychologists (*e.g.,* 7). Most workers fail to question the reality and primacy of pitch as an attribute of tones.

On the subject of volume, however, there is considerable disagreement. Rich (102, 103), Halverson (53), Boring (19), Bekesy (14), Stevens (131, 132), Dimmick (38), and Stevens and Davis (134) have stood forth in favor of its position as "a unique and distinct attribute of tones" (134). Banister (7), Gundlach (50), Gundlach and Bentley (51), and Zoll (159) oppose its independent existence. Rich (102) made the first determinations of the volumic limen in 1916. Repeating his experiment in 1919 (103), he was satisfied that he had confirmed his earlier results, though the volumic limens were considerably smaller in the second experiment. Halverson (53) demonstrated, in 1924, that volume is dependent on intensity as well as upon pitch. Boring (19) accepts these findings, but Banister (7) considers volume "a purely perceptual factor." Gundlach (50) declares, "The reports on volume bring it again into question as an attribute. . . . Perhaps it would be well if we could throw volume out, as Banister has desired, though certainly not for his reasons." (Gundlach would make volume the reciprocal of brightness; Boring and Stevens (21), and Stevens and Davis (134) claim brightness is density, but disclaim that density is volume.) Gundlach and Bentley (51) doubt the existence of volume as an independent attribute of tones. Zoll (159) concludes that owing to the instability of volume under experimental conditions, its phenomenal existence as an independent attribute of tones should be seriously questioned. Stevens (132), in the same year, concludes that, "We are justified in saying that volume is a phenomenal dimension of tones."

The diverse and opposed nature of the conclusions reached by various experimenters, then, is one argument favoring the view that volume is more ambiguous than pitch. As Gundlach says, "Disagreement arises not so much with respect to pitch and intensity as to volume and brightness. Physicists usually fail to recognize brightness except as differences in overtones, and ignore volume. Several psychologists class volume and brightness together as vocality or tonality. Banister would accept brightness, but discards volume as applying merely to the imaginal size of the sound source, while Boring ignores brightness, but erects on volume his theory of auditory localization. Similarly, we find disagreements as to the physiological dependencies of the attributes . . ." (50, *p. 187*).

This lack of agreement on the manner in which volume varies with the physical characteristics of the tone is a second argument in favor of its ambiguity. Many experimenters [Rich (102, 103), Halverson (53), Stevens (131, 132), Stevens and Davis (134), Banister (7), Watt (143)] hold that volume decreases with frequency and increases with intensity. Boring (19) maintains that volume is dependent on amplitude only and is quite independent of pitch. Gundlach (50) reports that, "contrary to Halverson's results, we fail to discover its relation to intensity. In fact, it may be remembered that on the siren disc the relation between volume and intensity is quite the reverse: the more voluminous (dull) tones were the less intense, . . . under the conditions of the experiment reported in [1927] the volume of one frequency did not seem subject to large fluctuations irrespective of the intensity changes" (*p. 195*). "It was almost impossible to get an equation for volume for the different tones [frequencies]" (*p. 193*). Zoll (159), using Halverson's method, tried to reproduce his results on the relation of volume to intensity, but failed. Halverson (53) also obtained evidence of a peculiar relationship between volume and phase-difference, but this relationship was not verified by Gundlach and Bentley (51).

There seems ample justification for Stevens' conclusion that, "experiments in which volume has been used as a basis of judgment have not yielded stable quantitative results. Consequently, there remain grounds for the divergence of opinion which exists among theorists as to the existence, the nature, and the possible physiological basis of the volumic attribute" (132, *p. 395*).

A further indication of the greater ambiguity of volume over pitch is found in the relative size of the differential limens. Even here, however, the results are not thoroughly consistent. Rich (102) found the volumic limen significantly larger than the limen for pitch. But, repeating his experiment (103), he found the volumic limens much reduced. Gundlach and Bentley (51) found limens yet smaller than those of Rich, though there was great variability among the observers. Halverson's limens (53) approximate those of Rich's original study (102). Stevens and Davis (134) conclude that the volumic limen is greater than the pitch limen.

Finally, the following comments by Stevens support our contention as to the greater ambiguity of volume. In an effort to explain "psychologists' failure to obtain convincing quantitative results," he cites "three reasons why volume is difficult to judge.

"(1) It is a relatively unfamiliar aspect of tonal stimuli: people are not taught from early youth to distinguish it, as they are taught to distinguish

pitch and loudness. Consequently, the training of the O becomes very important. (2) The O's criteria for volume, when once formed, are very instable. They are apt to change in the middle of a series of observations. (3) When two tones are sufficiently unlike in frequenty for them to be judged different in volume, the difference in pitch is necessarily larger and more conspicuous than the volumic difference and tends to obscure the latter" (132, *p.* 399).

The above arguments would seem to furnish support for the *a priori* assumption that volume is a more ambiguous, "unstructured" attribute of tone than is pitch. Given constant experimental conditions in the two situations, we may perhaps ascribe any difference in the "suggestibility" of the two attributes which appears in our results to this characteristic of stimulus-ambiguity.

In addition to the investigation of pitch and volume, a third attribute was introduced for experimentation. To provide a situation of still greater ambiguity, a quite novel attribute was "invented" for our purposes. This "new" attribute was arbitrarily defined as varying (with frequency and intensity) in the opposite manner to volume, increasing with pitch and decreasing with loudness. This makes it unlike any "existing" attribute (density and brightness increase with both pitch and loudness). The newly-defined attribute was given the impressive name, Orthosonority.[75] Since the subjects, no matter how familiar they might chance to be with the concept of volume, could never have heard of orthosonority; since no description of its nature (other than, "increases with pitch, decreases with loudness") was given to the subjects; and since no experimenters have reported a phenomenon varying in precisely the manner of orthosonority, it seems reasonable to suppose that this new attribute represents a yet more ambiguous, unstructured situation than does either pitch or volume. It is our purpose, therefore, to compare the relative susceptibility to suggestion of judgments on pitch, volume and orthosonority.

Procedure

The procedure of this experiment is based upon the experimental findings by Stevens and others (cf., 134) that both pitch and volume are functions of not only frequency but intensity of tone. These experimenters have worked out the manner in which these attributes vary with the physical characteristics of the tone, and we are able to use their findings as a basis for predicting what the judgments "should" be and what the result

[75] The author is indebted to Professor E. G. Wever for the coining of this mellifluous and authoritative term.

of misdirection through suggestion might produce. The apparent pitch of a tone of given frequency will vary in a definite way with changes in the intensity of tone. The same is true for volume. If we are able to influence the observers to judge pitch and volume as varying in the opposite manner, we may say that we have produced changes in the judgments of these attributes as a result of suggestion. If despite the suggestions, the subjects judge pitch and volume in the "correct" direction, we may say that judgment of these attributes was not susceptible to influence by suggestion.

For tones of low frequency (below about 2,000 ~), apparent pitch falls with increasing intensity. Apparent volume increases with increasing intensity, decreases with rising pitch. This relationship should be preserved in "correct" judgments. But if we are able to elicit judgments showing rise of pitch and diminution of volume with increased intensity, we shall have produced judgments according with our suggestions.

The method employed was modeled after that of Stevens (132, 133), who recommends the method of average error as most suitable for this type of discrimination. In pitch,

"Two tones of slightly different frequency were presented alternately to an observer. He was allowed to adjust the intensity of one of the tones until the pitch of the two appeared equal. In other words, the observer compensated for a difference in frequency by means of a difference in intensity, and thereby made the two tones equal in respect of pitch" (134, *pp. 70–71*).

In volume,

"The observer was given alternately tones of different frequency, and he varied the intensity of one until it equaled the other with respect to volume. In other words, it is possible to make two tones appear equal in volume when they are obviously different in both pitch and loudness. This result is achieved by making the higher tone more intense than the lower tone" (134, *p. 161*).

Stevens contends that this method of judgment compensates for the "three reasons why volume is difficult to judge":

"In order to overcome the difficulties inherent in the judgment of volume, the present study had recourse to what may be called a 'trans-dimensional equation.' The advantage of this method is that it puts volume, so to speak, into the hands of the O and gives him a chance to vary and examine it. He can manipulate the tone at will. He can make certain of his criteria by observing large differences in volume; and he can interrupt a series to reassure himself of his criteria whenever they begin to fail. Moreover, this method lessens the chances that volume will be

confused with pitch or loudness, and eliminates the tendency for the judgments to become 'absolute'" (132, *p.* 399).

If, in the face of these "advantages" of the method, we are still able to produce "suggestibility" in volume, we will have accomplished a feat!

Apparatus [76]

A Beat-Frequency Oscillator was used to produce the tones used as stimuli. To the oscillator was connected a variable pitch condenser which enabled the experimenter to vary the frequency of the comparison from that of the standard. The tonal stimulus was presented to the subject through a single Piezo-electric headphone. A rheostat controlled by the experimenter was used to adjust and keep constant the output of the headphone, which was registered on an output meter in the phone circuit. The subject made his judgments by manipulating a second rheostat which controlled the intensity of the tone in the headphone.

The controls and recording dials for these instruments were placed on the experimenter's side of a large plywood screen which separated experimenter from subject. The control knob for the subject's rheostat was placed on the subject's side of the screen, but an extension was added to the shaft and connected to a dial on the experimenter's panel whereby the subject's judgments could be observed and recorded. This dial on the experimenter's panel was scaled in arbitrary units which had been calibrated in decibel-values of intensity by comparison with a Western Electric 2-A Audiometer. It was thus possible to observe not only the final judgments of the subject, but also the "trial and error" manipulative activity in which he engaged before making his judgments.

Since this was an experiment in suggestion, a few "stage-properties" were employed, with the idea of impressing the subject with the profoundly scientific character of the whole undertaking. These "properties," it was hoped, would have the effect of endowing the suggestions about to be presented with the revered, slightly mysterious and indubitably truthful atmosphere of science. To this end, the experimental room was well stocked with scientific-appearing devices, all manner of irrelevant electrical apparatus and brass instruments. The subject was seated before a carefully prepared screen, to which were secured two aluminum radio control panels, resplendent with a score of glossy meters, knobs and dials, all in the tradition of truth and precision. It was the experimenter's secret that only one dial "worked."

[76] The author wishes to express his indebtedness to Professors E. G. Wever and C. W. Bray for their assistance in designing and constructing the apparatus used in this experiment.

The suggestion was presented in the form of a bakelite face-plate attached to the subject's dial, reading, INCREASE PITCH (VOLUME, ORTHO-SONORITY), and a prominent arrow indicating the direction in which to turn the dial (to follow the suggestion). No further suggestions were given than this silent suggestion of the label and the arrow indicating that he should "increase pitch (etc.)" by turning the dial in the indicated direction.

SUBJECTS AND INSTRUCTIONS

The experiment was presented as one among the series of experiments used in the course in Experimental Psychology at Princeton University, in the spring of 1938. The subjects were forty undergraduates, for the most part students in the Experimental course. In the investigation of each attribute, the subjects were divided into two groups. For the "experimental group," the set-up was as described above, including the suggestive face-plate on the subject's dial. This, therefore, was the group which was exposed to suggestion. For the "control group," the set-up remained the same, with the exception that for the dial bearing the suggestion was substituted a blank face-plate of similar dimensions. This group served as a control, to determine the response to the stimuli in the absence of suggestion. The division of subjects was so made that individuals who served as members of the experimental group in pitch were in the control group for volume, and vice versa. To control the factor of primacy, one half of each experimental group was allowed to judge volume first and the other half allowed to judge pitch first.

To familiarize the subject with the procedure and with judgment of the attributes, a number of practice trials were given before each series of judgments. Each subject then made twenty judgments upon each attribute. The entire procedure was carried out in one afternoon, requiring approximately two hours for completion. Rest periods were given the subject between his judgments of the different attributes, during which the experimenter made the necessary alterations in the apparatus, changed face-plates, etc. Upon completion of the experiment, each subject was asked to give an introspective report of his criteria for judgment of each attribute, the "ease" of judgment, his "satisfaction" with his judgments, and the subjective "reality" of each attribute.

The following directions were mimeographed and handed to each subject before beginning the experiment:

Attributes of Tones

Purpose: This is an experiment for studying some of the characteristics of sound. Here the subject will become acquainted with certain of the more prominent characteristics and their interrelations. This experiment involves the study of three of these qualities or attributes: pitch, volume and loudness. While each of these qualities is distinct and measurable in itself, each also varies with the others. A change in one attribute is accompanied by a change in the others. So we shall study the influence of a variation in a given attribute upon the appearance of the other attributes.

Procedure: E will be seated in front of one control-panel and S in front of another. S is presented first with a standard tone of given pitch, volume and loudness, and then with a second or comparison tone, differing from the standard in some respect. By manipulation of the dial which S controls, this second tone is then changed until it seems to be equal to the standard tone in respect to the attribute—pitch, volume or loudness—being studied in that trial.

Since the various characteristics of sound are closely related to each other, a direct change in one produces also an indirect change in the others. Thus S may, by manipulating a dial which controls one attribute, so change a second attribute as to make the tone equal in the second attribute to another tone which differs from the first tone in all other respects. We are here studying the amount of direct change in a tone necessary to produce sufficient indirect change to equate this tone to another in regard to some given attribute.

In order to give S a clearer conception of the characteristics which he is to judge, we may describe them as follows:

Pitch—pitch means the *height* of a tone; how high or low it is on the scale. For instance, as one runs up the keys of a piano from left to right, the sound of the notes seems to get *higher*. We say that the pitch is *increased* a half-tone with each key you advance up the board; on coming down, the sound is *lowered* in pitch a half-tone with each note struck. In judging pitch, pay attention to how *high* or *low* the tone seems.

Volume—volume refers to the bigness of a tone: how large or small it appears. Some tones seem big, seem to fill a great deal of space; while others are much smaller, occupying much less space. Some tones are voluminous, extensive; others are small, compact, filling little space. In judging volume, pay attention to the apparent *size* of the tone: how *big* or *small* the tone seems.

Loudness—loudness means the *strength* of a sound: whether the tone is strong or weak. For instance, if the piano keys are struck with much force, the sound will be strong and loud; if less force is used, it will be a soft or weak tone. In judging loudness, pay attention to the strength of the tone: how *loud* or *soft* the tone seems.

The procedure, therefore, is always for E to present a standard tone of given characteristics, and then a comparison tone of somewhat differing characteristics; and for S, by manipulating his own dial, to change the

comparison tone in such a way that it equals the standard in respect to the attribute being studied.

RESULTS

Low Pitch

The mean results of the experimental and control groups are shown in Table XX in terms of the loudness (decibels) of the comparison tone at which the comparison was judged equal in pitch to the standard.

The average result for the twenty subjects in the control group is 80.9 db ($\sigma = 7.05$). This represents a mean loudness difference of

TABLE XX

LOUDNESS OF COMPARISON TONE WHEN EQUATED TO STANDARD IN PITCH

(512~, 65 db.)

GROUP	N=	COMPARISON FREQUENCY	MEAN DB.	σ_M	DIFF. DB.	C.R.
Control	20	532	80.9	1.58	19.9	7.34
Experimental	20	492	61.0	2.12		

+ 15.9 db between the standard tone of 512 ~ and the comparison tone of 532 ~, when the two tones have been equated in pitch by these subjects. The subjects increased the loudness of the comparison tone to bring its apparent pitch down to that of the lower standard tone. The direction of change for this group is in accord with that reported by Stevens. "For low tones, the pitch decreases with intensity . . ." (134, *p.* 72). The magnitude of pitch change is greater than that obtained by Stevens (133), however. This discrepancy may be related to the fact that Stevens used but one observer in his experiment, while the present result represents the combined data of twenty subjects, who displayed rather large individual differences (S.D. = 7.05). Furthermore, the subject used by Stevens had "exceptionally good pitch discrimination," while the discrimination of many of the present subjects was relatively coarse, necessitating greater change in frequency to produce subjectively similar pitch differences.

The mean of the twenty experimental subjects was 61.0 db ($\sigma = 9.46$), representing a decrease of four decibels in loudness to equate the comparison tone of 492 ~ to the standard of 512 ~. Had the subjects followed the suggestion of the arrow on their dial, they would have increased the

intensity of the comparison. The mean result of the group, then, represents a departure from the suggested direction of change.

TABLE XXI

PITCH: EXPERIMENTAL GROUP

PITCH JUDGED FIRST				VOLUME JUDGED FIRST			
SUBJ.	M. DB	σ	CHANGE	SUBJ.	M. DB	σ	CHANGE
Sc.	90.10	3.6	25.10	Ow.	65.50	11.1	0.50
Da.	73.90	11.4	8.90	Wi.	64.65	4.3	−0.35
Bo.	66.75	4.1	1.75	Go.	60.25	0.5	−4.75
Mc.	65.00	4.6	0.0	Sm.	59.85	0.4	−5.15
Wri.	61.85	5.2	−3.15	Sh.	59.60	0.4	−5.40
Be.	59.75	3.5	−5.25	Ro.	58.15	1.23	−6.85
Cr.	59.55	3.3	−5.45	Vo.	57.30	1.18	−7.70
Br.	58.65	3.3	−6.35	Wr.	55.85	3.9	−9.15
Th.	55.95	5.8	−9.05	Rob.	54.45	1.4	−10.55
En.	39.05	12.3	−25.95	La.	52.70	3.2	−12.30
Group	63.1	3.93	−1.9	Group	58.8	3.88	−6.2

Total group (N=20) Mean=61.0 Sigma=9.46

PITCH: CONTROL GROUP

PITCH JUDGED FIRST				VOLUME JUDGED FIRST			
SUBJ.	M. DB	σ	CHANGE	SUBJ.	M. DB	σ	CHANGE
Ch.	88.90	4.8	23.90	Re.	89.75	4.03	24.75
Se.	88.15	1.7	23.15	Ru.	84.20	1.7	19.20
Co.	87.85	3.4	22.85	Cl.	83.20	0.7	18.20
Ca.	84.20	3.4	19.20	Jo.	81.30	2.8	16.30
Sec.	82.55	2.9	17.55	He.	80.30	1.5	15.30
Ki.	82.55	2.01	17.55	Pe.	80.10	2.1	15.10
St.	80.95	7.6	15.95	Pu.	80.05	0.8	15.05
Fo.	79.70	1.1	14.70	Mcc.	79.30	0.5	14.30
We.	79.50	0.5	14.50	Ho.	78.10	7.5	13.10
Ha.	70.90	5.9	5.9	Tr.	56.20	5.9	−8.80
Group	82.5	5.07	17.5	Group	79.2	7.68	14.2

Total group (N=20) Mean=80.9 Sigma=7.05

(Note: Each subject's score (M) represents the mean of twenty judgments.)

Since the direction of the arrow suggested an increase of loudness, the more complete their acceptance of this suggestion the more nearly would their results approach the value obtained with the control group. One

measure of the degree of acceptance of the suggestion is therefore the extent and reliability of the difference between the experimental and control group. The greater this difference, the less effective the suggestion in reversing the "true" direction of change. We find the difference between the experimental and control groups to be 19.9 db, with a critical ratio of 7.34. This would indicate that the suggestion was not very effective in shifting the judgments in the "incorrect" direction. The subjects failed to comply to any great degree with the suggestion.

However, the extent of their departure from the suggested direction is less than presumably would have been the case if the suggestion had not been offered. That is, the experimental subjects in equating for a 20 ~ difference, do not vary loudness as much as do the controls. The suggestion, while not so effective as to completely reverse the "true" direction of change, seems to have exercised an "anchoring effect." Instead of the 16 db change made by the controls, the experimental group made a change of only 4 db, which is not sufficient actually to equate the tones. The suggestion, therefore, does not reverse, but modifies judgments in this situation.[77]

That the suggestion is not without influence is evidenced by further analysis of the experimental group. In Table XXI are shown the scores of the individual members of the experimental and control groups. In the columns headed "change" are given the changes in loudness from the standard of 65 db. A negative sign indicates decrease of loudness, positive values reveal increase of loudness. It is clear that though the majority of the experimental subjects "resisted" the suggestion and decreased the loudness of the comparison tone below the standard of 65 db, four members of the group "accepted" the suggestion and increased the loudness above 65 db. The mean scores of two other individuals deviate hardly at all from 65 db. In the control group, on the other hand, all values save one are of the same sign, indicating that the members of this group, to varying extents, changed loudness in the same direction.[78]

It was stated in the section on Procedure that for each group, experimental and control, one-half the group was tested first on pitch and one-half judged volume first. The two halves of the groups are separated in

[77] The experimenter made this note after observing a number of the subjects in the experimental situation: "The subjects do respond to the suggestion on the dial, and have a tendency to react in the suggested manner, at first. Gradually, the 'true' response overcomes this. They show response to the dial by inquiring, expressing concern when the arrow points in one direction and the 'true' variation seems to be in the opposite direction."

[78] The deviate member of this group, *Tr.*, was consistent in showing "negativism" in other experimental situations. This quality was characteristic of his general behavior.

Table XXI to show the effect of the two procedures. With the control group there seems to be little consistent difference between the individuals who judged pitch first and those who judged volume first. The corresponding sections of the experimental group, however, show a somewhat greater difference. It is interesting to note that the mean of the experimental "pitch first" group is higher than that for "volume first" and that three of the four "suggestible" individuals judged pitch first. The "pitch first" group seems to be slightly more suggestible than the "volume first" group. May this be due to the fact that the "volume first" group had had experience with the experimental situation, while the situation was relatively novel or strange to those who judged pitch first? Perhaps the novelty of the experimental situation tended to render the subjects more suggestible than were those who had become more accustomed to the situation. It does not appear likely that the greater "resistance" of the "volume first" group is due to a specific transfer of a "habit" of turning the dial in a given direction, for in the volume situation they had turned the dial to the right (increasing the loudness), while for pitch they turned it to the left (decreasing the loudness).

TABLE XXII

DIFFERENCES BETWEEN GROUPS JUDGING PITCH FIRST AND THOSE JUDGING VOLUME FIRST

	MEAN DB.	σ_M	DIFF. DB.	C.R.	CHANCES IN 100
Experimental group					
Pitch first	63.1	1.24	4.3	2.34	99
Volume first	58.8	1.23			
Control group					
Pitch first	82.5	1.60	3.3	1.08	86
Volume first	79.2	2.43			

However, since the difference between "pitch first" and "volume first" for the experimental group is not statistically significant, and since the control group shows a similar, though smaller and less significant difference, the possibility suggested above remains merely hypothetical. The differences and their significances are summarized in Table XXII.

High Pitch

The group results of the experiment on high pitch (10,000 ~) are shown in Table XXIII.

The average loudness of the comparison tone, when equated to the standard tone by the control group, was 53.4 decibels ($\sigma = 2.68$). Since the standard loudness was 45 decibels, this represents an increase of 8.4 decibels to equate the pitch of the comparison tone to that of a standard tone 200 ~ higher in frequency. The direction of this change is opposite to that found for low pitch (512 ~), for here the subjects increase the intensity to "raise" the pitch. This result is again in agreement with the findings of Stevens, however, for he reports: "For low tones, the pitch decreases with intensity, but, for high tones, the pitch increases with intensity" (134, *p.* 72).

TABLE XXIII

LOUDNESS OF COMPARISON TONE WHEN EQUATED TO STANDARD IN PITCH

(10,000~, 45 db)

GROUP	N=	COMPARISON FREQUENCY	MEAN DB.	σ_M	DIFF. DB.	C.R.
Control	12	9,800	53.4	.77	12.7	10.0
Experimental	13	10,200	40.7	.94		

Moreover, the amount of change is apparently comparable to that found by Stevens (133). Stevens did not work at precisely 10,000 ~ but he reports results for the adjacent frequencies, 8,000 ~ and 12,000 ~. At 8,000 ~ an increase of 9.6 decibels produced an increase in pitch equivalent to 504 ~, while at 12,000 ~ an increase of 12.4 decibels increased pitch by 500 ~. In the present experiment we find that a change of 12.7 decibels produces a change in pitch equivalent to 400 ~. In view of the rather wide limits of error of the procedures used in both investigations, these results do not differ markedly from those of Stevens.

The suggestion given to the experimental group, in terms of the arrow on their dial, was that they equate the pitches by increasing the loudness of the comparison tone. To have done so would actually have moved the pitches farther apart, rather than equating them. If they had followed the suggested direction of change the experimental subjects would have increased the intensity, with the result that their decibel values would have approached those of the control group. In this case, the greater the acceptance of the suggestion, the less the difference between control and experimental groups and the lower the critical ratio of the difference. We find,

however, that the difference is 12.7 decibels, with a critical ratio of 10.0. This would seem to indicate that the suggestion was not greatly effective in altering the "true" direction of change of high pitch with intensity.

Inspection of Table XXIV, which shows the individual averages of the experimental and control subjects, reveals that the experimental subjects were unanimous in *decreasing* rather than (as was suggested) increasing the comparison intensity. The mean of the total group is 40.7 db ($\sigma = 3.39$), or a decrease of 4.3 db below the standard intensity of 45 db. We may conclude that in our experimental situation, judgments of the change of high pitch with intensity were not reversed from the "correct" direction by the suggestive influence of the arrow on the dial.

TABLE XXIV

INDIVIDUAL SCORES IN EQUATING HIGH PITCHES

(Standard=10,000~, 45 db)

CONTROL GROUP				EXPERIMENTAL GROUP			
SUBJ.	M.	σ	CHANGE	SUBJ.	M.	σ	CHANGE
Ow.	56.00	2.8	11.0	Wr.	44.55	2.2	−0.45
Vo.	55.35	0.9	10.35	Sh.	43.85	0.4	−1.15
Ch.	55.30	1.2	10.30	Wi.	43.80	1.05	−1.2
Pu.	54.55	0.9	9.55	Go.	43.45	3.2	−1.55
Wri.	54.30	2.7	9.3	Jo.	43.30	1.2	−1.70
We.	53.55	0.9	8.55	Ru.	41.25	1.14	−3.75
Sm.	53.20	1.05	8.20	Ro.	41.15	1.30	−3.85
Sc.	52.15	1.7	7.15	Rob.	40.70	0.4	−4.3
Re.	50.95	0.4	5.95	Fo.	39.95	1.10	−5.05
Br.	50.75	1.3	5.75	Se.	39.35	1.27	−5.65
Mcc.	50.20	1.05	5.20	Hc.	39.30	2.4	−5.7
St.	50.10	1.1	5.10	La.	37.55	0.96	−7.45
				Cl.	31.45	2.3	−13.55
Group	53.4	2.68	8.4	Group	40.7	3.39	−4.3

Again, however, we find evidence of what may be an "anchoring effect" of the suggestion. That is, the experimental group did not introduce as great a change of intensity in their equations as did the control group (4.3 db versus 8.4 db, respectively). The greater change made by the control group would seem to be more nearly in line with the findings of Stevens and presumably represents more accurately the "proper" amount of change. The experimental group, in making a change approximately half as great, may be reflecting an influence of the suggestion in restricting the control imposed upon the judgments by objective stimulus-conditions.

By way of accounting in part for one difference found between the experimental groups in the high pitch situation and the low pitch situation, we may mention a difference in the "difficulty" of the situations. It will be recalled that the members of the experimental group for low pitch were not unanimous in their "rejection" of the suggestion, while we have found consistent rejection displayed by the experimental group for high pitch. This greater consistency in the high pitch group may be related to the fact that the "logical reasoning" required for "critical response" (as opposed to "suggestion" response "in the absence of logical grounds") is less difficult in the high pitch than in the low pitch situation. The difference in "difficulty" is due to the fact that the direction of pitch-change with intensity is reversed for high pitches. Consequently, though the direction suggested by the arrow on the high pitch dial is incorrect for purposes of equation, the label on the dial is "correct" in its statement: *i.e.*, the dial, when turned as indicated, actually does "Increase Pitch." Since the dial "does" what it "says," the task of the high pitch group is simply to "reason" that they must do the opposite of what the dial indicates (*i.e.*, they must "decrease pitch" to equate the tones). This is simply done by turning their dial in the contrary direction.

The task of the low pitch group is made more difficult by the fact that the dial produces the opposite effect to that stated. Here, not only is the direction of the arrow misleading, but the label too is "false." Thus, this group, to respond "critically," must "reason" that they should manipulate the dial not only in opposition to the arrow but also without regard for the label. If this difference in the requirements of the two situations represents a difference in difficulty, it may be that the high pitch group is demonstrating that suggestion is more easily "resisted" in less complex situations; whereas more difficult situations result in greater acceptance of suggestion, as shown by the more frequent "yielding" among the low pitch subjects.

Volume

As a standard stimulus for the experiment on tonal volume, a tone of 1,024 ~ at 65 db was employed, with comparison stimuli 30 cycles above and below this. For the control group, the comparison tone was higher, 1,054 ~. The higher tone is of less volume, and must be increased in volume for purposes of equation with the standard. This is done by increasing the intensity of the comparison tone. The experimental group, on the other hand, received a comparison tone of 994 ~, which is of greater volume than the standard and must be decreased by decreasing the intensity. The suggestion given the experimental group was to the opposite effect, to turn the dial in such a way as to increase the intensity, which would actually make the volumes more dissimilar.

The results of the experimental and control groups for volume are shown in Table XXV. The table indicates that the control group varied intensity

TABLE XXV

LOUDNESS OF COMPARISON TONE WHEN "EQUATED" TO STANDARD IN VOLUME
(Standard=1,024~, 65 db)

GROUP	N=	COMPARISON FREQUENCY	MEAN DB.	σ_M	DIFF. DB.	C.R.
Control	20	1,054	78.9	1.37	2.2	.99
Experimental	20	994	81.1	1.70		

TABLE XXVI

VOLUME: EXPERIMENTAL GROUP

PITCH JUDGED FIRST				VOLUME JUDGED FIRST			
SUBJ.	M.	σ	CHANGE	SUBJ.	M.	σ	CHANGE
Co.	93.80	1.2	28.80	He.	87.50	5.4	22.50
We.	90.75	0.5	25.75	Ho.	84.55	11.6	19.55
Ki.	89.90	1.8	24.90	Pe.	82.50	0.96	17.50
St.	86.35	3.9	21.35	Ru.	80.85	3.9	15.85
Ha.	83.90	12.6	18.90	Jo.	77.35	2.9	12.35
Fo.	83.55	1.84	18.55	Cl.	74.60	3.3	9.60
Sec.	82.40	3.8	17.40	Pu.	73.60	1.8	8.60
Ca.	81.95	3.6	16.95	Re.	73.40	1.6	8.40
Ch.	81.90	5.0	16.90	Mcc.	72.15	2.4	7.15
Se.	79.40	1.87	14.40	Tr.	58.60	6.2	–6.40
Group	85.4	4.42	20.4	Group	76.9	7.70	11.9

Total group (N=20) Mean=81.1 Sigma=7.58

VOLUME: CONTROL GROUP

PITCH JUDGED FIRST				VOLUME JUDGED FIRST			
SUBJ.	M.	σ	CHANGE	SUBJ.	M.	σ	CHANGE
Br.	93.75	2.21	28.75	Wr.	84.30	6.6	19.30
En.	91.50	4.1	26.50	Vo.	84.25	2.8	19.25
Mc.	82.15	3.9	17.15	Sm.	80.25	2.9	15.25
Da.	80.35	14.2	15.35	Rob.	80.05	1.7	15.05
Be.	77.40	2.0	12.40	Ro.	78.15	2.24	13.15
Cr.	77.15	7.6	12.15	Sh.	76.85	1.4	11.85
Th.	76.85	3.0	11.85	Ow.	76.30	2.0	11.30
Sc.	75.65	2.3	10.65	Wi.	75.85	1.05	10.85
Wr.	71.30	10.0	6.30	La.	75.45	0.5	10.45
Bo.	65.75	1.4	0.75	Go.	75.30	1.0	10.30
Group	79.2	8.01	14.2	Group	78.6	3.26	13.6

Total group (N=20) Mean=78.9 Sigma=6.12

in the "correct" direction, increasing the loudness of the higher tone by 13.9 db to make its volume equal to the greater volume of the low standard tone. The direction of this change is in accord with that found by other experimenters. ". . . It is possible to make two tones equal in volume when they are obviously different in both pitch and loudness. This result is achieved by making the higher tone more intense than the lower tone" (134, *p. 161*).

The experimental group, given a lower comparison tone, should have decreased its loudness to effect volumic equation with the standard. We find, however, that this group, too, increased the loudness. Corresponding with the suggestion given on their dial, they increased the comparison intensity to 81.1 db, 16.1 db above the standard loudness. This result indicates response to the suggestion rather than to the actual requirements of the situation.

TABLE XXVII

DIFFERENCES BETWEEN GROUPS JUDGING PITCH FIRST AND THOSE JUDGING VOLUME FIRST

	MEAN DB.	σ_M	DIFF. DB.	C.R.	CHANCES IN 100
Control group					
Pitch first	79.2	1.79	0.6	0.21	58
Volume first	78.6	.73			
Experimental group					
Pitch first	85.4	.99	8.5	2.87	99.8
Volume first	76.9	1.72			

In Table XXVI are shown the means of the individual members of the control and experimental groups. These results indicate that all members of the control group manipulated intensity in the "correct" direction, while all save one of the experimental group changed intensity in the suggested "incorrect" direction.[79] Table XXVI shows also the results for those subjects who judged pitch first and those who judged volume first. For the control group there is little difference between the results of the two procedures. Table XXVII (above) summarizes the differences between "pitch first" and "volume first."

[79] The one member, *Tr.*, who failed to respond positively to the suggestion, is the same individual who, as a member of the control group for low pitch, also opposed the direction of his judgments to that of the remainder of the group. The contrary judgments, in these two situations, of this lone individual may be related to personality characteristics of this particular subject. It was noted, by instructors having contact with him throughout the year, that he was inclined to be negativistic in his responses. His general behavior and attitude about the laboratory fit into a picture of "negative suggestibility."

While the difference is not significant for the two sections of the control group, it is considerably greater for the experimental group. The group which judged pitch first shows an increase of loudness 8.5 db above that of the "volume first" group, a difference which approaches statistical significance. In accounting for this difference, one relevant condition may be found in the previous experience of the "pitch first" group with the experimental situation. In the pitch situation these individuals had been members of the control group and had so manipulated the dial as to increase intensity (mean value for pitch control group, "pitch first," = 82.5 db). Perhaps a "transfer of training" might have operated to raise the values for these individuals above those of the "volume first" group. However, since the "volume first" group, which had not received such prior "training," also responded to the suggestion, it is probable that "transfer" favors the augmented response of "pitch first" individuals but is not in itself the only explanation of their results. Suggestion is apparently effective for both sections of the experimental group in volume.

Orthosonority

We have found that the relatively ambiguous situation involving judgment of tonal volume yields greater suggestibility than does judgment of the more definite attribute, pitch. To carry the test a step further, a yet more ambiguous tonal attribute was "invented" for experimentation. To this new attribute was given the impressive name, "Orthosonority." It was decided that "orthosonority" should vary in the opposite manner to volume. The only description of orthosonority, then, which was given to the subjects was that it "increases with pitch and decreases with intensity."[80] Whereas the attributes volume and pitch were carefully described before the subjects began their judgments, no further description whatsoever was given of orthosonority. Repeated questionings on the part of the subjects revealed that they were quite at a loss as to how to conceptualize the attribute. Their queries, however, were met with a bare reiteration of the nature of its variation with pitch and intensity.

The subjects judged orthosonority shortly after they had completed their judgments of volume. To equalize the effects of varying conditions in the volume situation, subjects for the "experimental" and "control" groups in orthosonority were therefore so divided that half of each group had been members of the control group for volume. Since the arrows on both dials, Increase Volume and Increase Orthosonority, pointed in the same direction,

[80] Orthosonority therefore does not correspond to "density" or "brightness," which increases with both pitch and intensity.

while orthosonority was claimed to be a "different" attribute, it was thought advisable to reverse the direction of intensitive variation of the tone for a given direction of turning of the dial. In the volume situation the subjects had found that turning the dial to the right increased the intensity. Therefore a concealed switch was inserted in the circuit whereby, for orthosonority, a turn to the right decreased the intensity. It was also hoped that this unexpected change might increase the "mystery" of the situation and increase the possibility of the subjects' belief in the new attribute. Finding that "something had been done" to the apparatus might bolster their readiness to accept a novel attribute.

The subjects for the orthosonority experiment were divided into two groups. With the "control" group, the effort was made to influence their judgments in the "correct" direction. That is, they were given a comparison tone of lower pitch than the standard. This tone was therefore of "less" orthosonority, and the "correct" response would be to increase the orthosonority by decreasing the intensity. The dial placed before this group suggested "increase orthosonority" by decreasing intensity and consequently was "correct." With the "experimental" group, the comparison tone was higher in pitch than the standard, therefore of "greater" orthosonority. The "correct" response would have been to decrease orthosonority by increasing the loudness. For this group, the arrow and the suggestion "increase orthosonority" were therefore "incorrect."

The mean results for these two groups are presented in Table XXVIII (below). The standard tone was of 1,024 cycles, at 75 db. The comparison tones were 30 cycles above and below the standard.

TABLE XXVIII

LOUDNESS OF COMPARISON TONE WHEN EQUATED TO STANDARD IN ORTHOSONORITY
(Standard=1,024~, 75 db)

GROUP	N=	COMPARISON FREQUENCY	MEAN DB.	σ_M	DIFF. DB.	C.R.
"Control"	14	994	63.5	3.18	2.5	.68
"Experimental"	14	1,054	66.0	1.58		

These results indicate that the response of both groups fell in the "suggested" direction. The suggestion in each case was toward a decrease of intensity. The "control" group decreased intensity by 11.5 db, which was in this case "correct." The "experimental" group decreased intensity

by 9 db, which for them was "incorrect." The difference between the mean values for the two groups, 2.5 db, yields a critical ratio of only .68, indicating the responses of the two groups were not significantly different. Had the experimental group resisted the suggestion, their change would of course have been in the opposite direction, with a correspondingly great difference in intensity value and in the critical ratio of the difference.

The scores of the individual subjects in each group are shown in Table XXIX (below). It will be noted that no subject of either group departed from the "suggested" direction.

TABLE XXIX

LOUDNESS OF COMPARISON TONE WHEN EQUATED TO STANDARD IN "ORTHOSONORITY" (Standard=1,024~, 75 db)

"CONTROL" GROUP				"EXPERIMENTAL" GROUP			
SUBJ.	M.	σ	CHANGE	SUBJ.	M.	σ	CHANGE
Sm.	72.35	1.1	−2.65	He.	73.6	0.7	−1.4
Vo.	71.35	1.2	−3.65	Sc.	72.9	1.1	−2.1
Pu.	71.05	0.5	−3.95	Cr.	72.1	1.9	−2.9
We.	70.85	1.8	−4.15	Ro.	70.6	0.5	−4.4
Pe.	70.05	0.5	−4.95	Cl.	69.1	0.4	−5.9
Fo.	69.30	1.2	−5.70	Sh.	68.7	2.0	−6.3
Ho.	68.50	8.7	−6.50	Ru.	65.7	2.6	−9.3
St.	66.00	2.1	−9.0	Jo.	65.5	4.7	−9.5
Se.	65.10	1.98	−9.90	Wr.	65.3	5.9	−9.7
Ow.	64.50	3.5	−10.50	Wri.	64.8	7.4	−10.2
Br.	64.25	3.4	−10.75	Rog.	64.2	3.4	−10.8
Mc.	63.65	2.5	−11.35	Wi.	64.2	1.8	−10.8
Ch.	43.30	12.2	−31.70	Go.	55.6	4.4	−19.4
Re.	28.50	5.9	−46.50	La.	52.1	7.8	−22.9
Group	63.5	11.9	−11.5	Group	66.0	5.92	−9.0

In the light of these results, it would appear that subjects can be induced to judge a totally unfamiliar attribute of tones, and that the direction of their judgments may be influenced by suggestion in either the "correct" or the "incorrect" direction.

INTROSPECTIVE REPORTS

To see if we might gain some idea of the processes taking place within the subject as he made judgments on the various attributes, each subject was requested to give an introspective report immediately upon conclusion of the experiment. The subjects in this experiment were not, of course, trained introspectionists, and their reports are consequently not of an

"expert" nature. To supplement their introspections, the subjects were questioned as to the basis upon which they had made their judgments, what form of imagery they employed, the relative "difficulty" of the various discriminations and the subjective "reality" of the attributes.

Pitch

Though the quantitative results of most of the experimental and control subjects for pitch were in agreement with the findings of other experimenters that pitch may change with intensity as well as with frequency, the introspections reveal that there was by no means unanimous "satisfaction" with the judgments rendered. A certain proportion of the subjects maintained that pitch did not change with intensity, or that the change of intensity did not equate the standard and comparison pitches. The subjects were queried as to their knowledge of music, and it frequently occurred that subjects who were dissatisfied with the change of pitch with intensity were individuals who listened to a great deal of music or themselves played a musical instrument.

(*He.,* Control, low pitch) It's all the same pitch, just dimmer. It doesn't seem to change much. I can't quite make it.

(*Ow.,* Experimental, low pitch) I can't tell any difference in the tone—it just gets *louder.* There is no change in pitch.

One subject reported an interesting basis for his dissatisfaction concerning decrease of low pitch with intensity:

(*Sc.,* Experimental, low pitch) I didn't really feel I had changed the pitch. I made more of a change in high pitch than on low. Your ears are conditioned when you listen to a lot of music. It usually goes *up* to a climax and gets *louder,* so you think of a *louder* tone as getting *higher.* (He was much disturbed about it): I'm afraid I'm going contrary to what it should be, but that's just the way I feel. (He is very serious and concerned about the matter.) I get a sort of feeling of beats when I get it. I felt mostly that the pitch remained the same all the time. (Repeats his idea): When you get a swell like that in music, it usually goes up.

This subject, who was musically inclined and had the best pitch discrimination of all subjects, nevertheless was the most "suggestible" member of the experimental group for low pitch. His suggestibility in this situation may be related to his conviction that "You think of a louder tone as getting higher." When he was given a comparison tone of lower pitch than the standard, he increased (by 25 db) the comparison intensity to equate them. In his case, then the suggestion on the dial corresponded

with his pre-existing attitude, and we find a relatively sophisticated subject displaying high "suggestibility."[81]

Volume

Though little or no use of imagery is reported for the judgments of pitch, several types of imagery are described for volume.

(*Th.*) It seemed that the smaller the volume, the thinner it was. Something like a line. You increased the second [comparison] until the two lines seemed to be equal.

(*Da.*) I used an image of railroad tracks. The width of a scratch made on a rail. One tone was like a pin scratch, the other like a nail scratch—wider and heavier.

(*Se.*) I pictured the sound in a big room and in a small room. The big room was big volume. I used the quality of re-echoing.

(*Ow.*) I associated a weak tone with coming from a little box and a big hollow sound coming out of a big box, and the hollowish quality made it large in volume.

The reports indicate that the majority of the subjects were apparently judging volume, in the accepted psychological sense of the term, rather than judging some different attribute under the same name. Their descriptions of "what they had in mind," though varied in specific content, are in general agreement with the concept of volume as it is commonly accepted. To check this farther, the subjects were asked to describe the manner in which volume varies with pitch and intensity. Though the manner of variation had not been told to them, all save two of the descriptions were accurate. Of the control group, 11 stated that low tones were of larger volume. Eight added that loud tones too were larger. One subject was incorrect, in stating that "soft" tones were larger. Nine of the experimental group described low tones as larger, and 6 described loud tones as larger. One of the experimental subjects was incorrect, stating that high tones were larger. The responses, therefore, show that not only the control but even many experimental subjects were able correctly to describe the change in volume with pitch and loudness. Yet the experimental group responded almost unanimously to the suggestion that they change the tone in the opposite direction.

Orthosonority

While we have some idea as to what the subjects were judging when reporting on pitch and volume, it is more difficult to say precisely what they

[81] As a member of the control group for high pitch, he responded in the same manner. Both his conviction and his judgments were "correct" for this situation.

were judging as "orthosonority." The subjects themselves frequently have difficulty in verbalizing their bases for judgment. For the "control" group it would have been possible to judge in terms of pitch, for the comparison tone was of lower pitch and decreasing the loudness would tend to raise it toward the standard in pitch as well as in orthosonority. Some, but not all of the subjects report that they did judge in terms of pitch. The introspections convey their varied reactions to the task of judging "orthosonority."

(*Ow.*, standard higher) I tried to equate in terms of pitch. The standard was high and the comparison was lower. When the pitch is equal the orthosonority is the same. I thought of a keyboard on the piano. The standard is to the right and the comparison to the left. And I thought of going up the keys from left to right.

(*Cl.*, standard lower) Orthosonority was a tough one. I didn't know exactly what it was. I don't know exactly how to explain it. It started out high; instead of looking for highness I was looking for smoothness. It's hard to describe.

(*Se.*, standard higher) There was something there—a sort of similarity. But I couldn't define it.

(*Mc.*, standard higher) You figure it on a scale going down from the standard to the comparison. Then you raise the comparison up. (He seemed very pleased and satisfied with orthosonority. For the first few judgments, he seemed worried and unsure. Then suddenly he said, "I've got it! Oh, sure—that's keen, isn't it!")

(*He.*, standard lower) Orthosonority is like matching two vacuum cleaners with different noises to them. And different distances apart—the *hiss*. *Fullness* in tone, that's what it amounts to.

(*Wri.*, standard lower) I could tell it. It seemed like a dull quality. I think I was actually judging orthosonority. It was the easiest to get and the most real.

(*Sc.*, standard higher) What the hell *is* orthosonority? This is the silliest thing I've ever done. I tried to get imagery, but all I could get was volume and pitch. (He was very disquieted about what orthosonority is. Confused it with volume and pitch. He manipulated the dial to zero intensity and then to highest intensity. Tried to get cues from the experimenter as to what to do.) Orthosonority doesn't make much sense to me. I just got sort of resigned to it. The higher tones sounded higher in pitch and volume. I would still like to know what orthosonority is. I think it is a little bit of psychological skullduggery.

The last subject was the only one who seemed to suspect anything amiss in the orthosonority experiment.

To gain a more adequate notion of how the orthosonority was viewed by the subjects, a table was made showing the distribution of their comments. Table XXX (p. 106) indicates the number of subjects in the control group (standard higher) and experimental group (standard lower) who felt orthosonority to be "real"; the number who thought orthosonority was "easy" to judge; who were "satisfied" with their judgments; who experienced some form of imagery in judging orthosonority; who identified orthosonority with pitch; and finally, the experimenter's impression of the amount of trial and error behavior in judging orthosonority.[82]

This classification of the introspections is incomplete, in that it includes only those comments which were sufficiently unequivocal to be definitely categorized. However, it is of some assistance in gaining a picture of how a number of the subjects experienced the orthosonority situation. In each group, control and experimental, two-thirds or more felt orthosonority was *unreal*. The majority of each group, however, considered it *easy* to judge. While the controls were equally divided between satisfaction and dissatisfaction, all of the experimentals who expressed themselves were *satisfied* with their judgments. There tended to be little trial and error in making the judgments. The subjects were divided on the question of imagery; about as many did experience it as did not. Two controls and four experimental subjects contended that orthosonority was similar to pitch.

The experimenter, in observing the subjects' general activity during the course of the experiment, noted substantially the same features in the attitudes of the subjects who did not offer introspections specific enough to be included in Table XXX.

An attempt was also made to obtain from the reports a ranking of the three attributes, pitch, volume, and orthosonority, in terms of their apparent "reality" and the ease of judging them. Although many of the subjects were specifically queried on these points, their responses were so diversified as to make the resulting rank-order rather unsatisfactory as a representation of more than a general group tendency. The indications seem to point to orthosonority as the "easiest" to judge, with volume next and pitch, especially high pitch, frequently the most difficult. As regards the "reality" of the attributes, however, pitch is definitely the most real; orthosonority and volume lag behind with a slightly greater proportion favoring the reality of orthosonority over that of volume!

[82] Such behavior on the part of the subject was observable to the experimenter in terms of the subject's manipulation of his dial. "Trial and error" here refers to a process of turning the dial repeatedly from side to side before arriving at a judgment. Some subjects repeatedly explored low intensities and high intensities, in alternate swings of the dial; others brought the dial rather directly to a final setting, with little manipulative behavior.

TABLE XXX

CLASSIFICATION OF INTROSPECTIONS ON ORTHOSONORITY

	N=	"REAL"		"EASY"		"SATISFIED"		IMAGERY		IS PITCH	T. & E.	
		YES	NO	YES	NO	YES	NO	YES	NO	YES	MUCH	LITTLE
"Control"	14	3	7	2	1	3	3	6	7	4	0	2
"Experimental"	14	2	4	7	2	4	0	5	5	2	1	1
Total Group	28	5	11	9	3	7	3	11	12	6	1	3

Pooling these various observations, we may note that, with exceptions in nearly every case, orthosonority seems to be easy to judge, observers are satisfied with their judgments, there is less trial and error in the judging, and the attribute does not seem real. Volume and pitch are more difficult to judge, but pitch is considerably more "real" as an attribute than are orthosonority and volume.

What bearing do these introspective results have upon the problem of the relative susceptibility of the attributes to suggestive modification? A tentative interpretation might be offered along these lines:[83] in the experimental situation, the subjects are initially inclined toward responding in whatever ways seem indicated by the experimenter or the apparatus. Roughly, they "would like to do what the experimenter wants." In orthosonority, which is apparently a relatively "unreal" phenomenon, there are few objective constraints inhibiting such response, with the result that the subjects readily "accept" the suggestions, and feel satisfied and even pleased with thus complying. In the pitch situation, however, though the same initial inclinations may hold, there seem to be certain objective criteria, perhaps inherent in the process of judging the more "realistic" pitch, which militate against compliance in their responses; criteria strong enough in most cases to produce "non-suggestibility." Such a "conflict" situation may disturb the subjects, rendering the judgment "difficult" and the subjects "unhappy" in the situation. Volume may perhaps occupy an intermediate position with regard to these characteristics.

Such an interpretation, it must be recognized, is largely hypothetical, representing an attempt to draw from the obtained data a meaningful picture of what the subjects were doing in the suggestion-situation and of what may lie back of the responses they made to their various tasks.

SUMMARY

We have tried to set up a situation conforming to the general procedure of experiments on "ideo-motor" suggestion, with the added possibility of varying certain characteristics of the situation in such a manner as to ascertain whether some yield greater, and some less, suggestibility. To this end, we selected three attributes of tone as representing varying degrees of ambiguity. For pitch, volume, and a novel attribute, "orthosonority," we attempted to influence judgments of the attributive change with intensity. The experimental groups received suggestions, in the form of a label and arrow on the face-plate of the subjects' intensity-control, that they

[83] The author is indebted to Professor E. G. Wever for suggestions as to certain of these possibilities of interpretation.

alter the intensity in the "incorrect" direction. By comparing their judgments with those of the control groups who received no suggestion, we are able to determine the effectiveness of the suggestions in modifying judgments of these three attributes.

The results indicate that judgments of both low pitch (512 ~) and high pitch (10,000 ~) were not, in the majority of cases, subject to reversal by the suggestions employed. Judgments of volume, on the other hand, were in most cases reversed under the influence of suggestion. Judgments of orthosonority, when made under the influence of "correct" suggestion, were consistently in the "correct" direction. This direction was as consistently reversed, under the influence of "incorrect" suggestions.

To summarize our evidence for these conclusions, the differences between the means of the various experimental and control groups, and their critical ratios, are brought together in Table XXXI.

TABLE XXXI

SUMMARY OF GROUP RESULTS ON TONAL ATTRIBUTES

Showing loudness of comparison tones when equated to standards in regard to pitch, volume and orthosonority

GROUP	N=	COMPARISON FREQUENCY	MEAN DB.	σ_M	MEAN DB. CHANGE	DIFF. DB.	C.R.
Low Pitch							
Control	20	532 ~	80.9	1.58	15.9	19.9	7.34
Experimental	20	492 ~	61.0	2.12	−4.0		
High Pitch							
Control	12	9,800 ~	53.4	.77	8.4	12.7	10.0
Experimental	13	10,200 ~	40.7	.94	−4.3		
Volume							
Control	20	1,054 ~	78.9	1.37	13.9	2.2	0.99
Experimental	20	994 ~	81.1	1.70	16.1		
Orthosonority							
Control	14	994 ~	63.5	3.18	−11.5	2.5	0.68
Experimental	14	1,054 ~	66.0	1.58	−9.0		

The values in this table confirm the conclusions as to the respective "suggestibility" of the attributes studied. It was suggested to the experimental groups for high and low pitch that they increase intensity to equate pitch, yet both groups show a mean decrease of intensity. The differences between the experimental and control groups are in each case significant, the critical ratio for high pitch being somewhat greater (10.0) than that for

low pitch (7.34). To the experimental group for volume was suggested an increase of intensity, with a resulting increase of 16 db. There is an almost negligible difference, therefore, between the experimental and control means on this attribute, the critical ratio being .99. The orthosonority "control" group received suggestion to decrease intensity (which was "correct"), the "experimental" group received the same suggestion (which was for them "incorrect"). Both groups decreased the intensity (— 11.5 db and — 9 db, respectively), and the critical ratio between them is only .68.

In terms, then, of both per cent of subjects yielding to suggestion and of the critical ratios between experimental and control groups, it would appear that of the attributes investigated, high pitch is most resistant to suggestion, low pitch next so; volume is almost completely "suggestible," and orthosonority is consistently suggestible in either the correct or the incorrect direction. The relative "suggestibility" of these attributes thus increases directly with increasing degrees of attributive "ambiguity," when ambiguity is judged in terms of evidence marshalled from the literature and from the present experiment.

CHAPTER VII

INTERPRETATION

AN effort to discover conditions under which individuals accept suggestions, and to compare these with conditions under which suggestions are rejected, has led to the exploration of relations existing between this acceptance-rejectance behavior and the motivational and situational conditions under which it is displayed. Suggestion has been viewed as an instance of what Hartmann calls "framework responses," responses taking place within and determined by a framework of internal determining-factors and external stimulus-conditions. We have sought to attack experimentally certain of the motivational conditions underlying the suggestion-process, as expressed in attitudes toward the content of the suggestions, and the influence upon these factors of situational characteristics within which the suggestion process is found to operate.

Though we do not propose to enter here into a lengthy discussion of theories of suggestion, it might be well to compare in brief fashion our results with those of other investigators, and to indicate their possible significance for suggestion-theory. It may be pointed out first of all, that the results obtained in this investigation do not break with, but supplement findings of previous studies of suggestion. What is offered here, it is hoped, does constitute a new experimental emphasis and a clarification of neglected relationships, which may in turn suggest some modification of certain existing interpretations. The results, however, are quite in line with facts long-established in the field of suggestion, and they lend themselves to interpretation in terms quite comparable with those of equally long-established theoretical formulations. Let us review the salient features of our own work, and connect them with these facts and theories.

Two principal relationships have emerged from the present series of investigations. (1) The results of our first experiments are univocal in speaking for the importance of *pre-existing attitudes* in determining the acceptance and rejection of suggestions. (2) The results of our further procedures likewise argue for the relation of suggestibility to such characteristics *of the situation* as *difficulty* and *ambiguity*.

(1) It is found that subjects accept, in general, those suggestions which "fit" with their existing attitudes, even when alternative suggestions are

available, offered simultaneously and in similar manner. If, now, one is concerned with achieving some description of the internal determinants of behavior in the suggestion-situation, it may be fruitful to conceptualize our findings in terms of their implication of the correspondence of a suggestion with an individual's frame of reference as a highly important condition of suggestion. Cantril (32), has pointed out the desirability of employing the term "frame of reference" to denote the implicit system of values underlying the expression of any given attitude and based upon the various "conditioning-processes" to which the individual has been exposed in the course of his experience. The "frame of reference" is the organization of values and "attitudes" (in the common sense of the term) inferred as determining the explicit attitude which may be expressed in response to a given stimulus. Cantril would reserve the term "attitude" for the overt expression of response in any given situation. The distinction is, of course, comparable to Thurstone's usage of the terms "attitude" and "opinion," [84] and represents an attempt to extricate the term attitude from the confusion of "general" and "specific" implications into which it has fallen.

Confining ourselves for the most part to the description of *observed* behavior, we have thus far employed the term attitude in Cantril's sense of the expressed position in respect to an issue. In the interests of more complete description, it may now be desirable to point to the relationships between specific expressions of attitude as indicative of an underlying "frame of reference" which is influential in conditioning the acceptance of suggestion. It seems justified, in view of the relationship consistently demonstrated between expressions of attitude and between attitudes and acceptance of suggestion, to infer the presence of some such "disposition," with which the total process is associated. Thus, it may be said that individuals will tend to accept suggestions which accord with their frames of reference, and tend to reject suggestions which conflict with these frames.

On the other hand, if one prefers not to draw inferences as to the operations taking place "within" the organism, more cautious interpretation in terms of expressed attitudes may prove more acceptable. It is demonstrable that individuals tend to accept suggestions which are in agreement with their expressed attitudes, and to reject suggestions conflicting with such attitudes.

[84] "Attitude" being, for Thurstone, "the sum total of a man's inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats, and convictions about any specified topic." "Opinion" is "a verbal expression of attitude" (138, *p.* 531).

Both formulations emphasize the importance, in suggestion, of what William James described as "the will to believe." The statement in terms of "frame of reference" also calls to mind Herbart's "apperceptive mass." The present results support Hartmann's recollection of Herbart's "maxims" in his conclusion that "Those ideas will be most readily assimilated by the voter which fit in with his present 'apperceptive mass,' which are joined with some prepotent wants, which meet him on his own level and lead him on from where he is" (55, *p. 114*).

Other, and more modern writers, have made a place in their descriptions of suggestion, for the influence of attitudinal factors. Many textbooks include attitudes as determiners of suggestibility [*e.g.,* Katz and Schanck (69), Bird (18), etc.]. Other writers have gone yet farther, incorporating the attitudinal factor into the actual definition of suggestion: Young (157), Doob (39). Our present discussion also bears marked similarity to that of Gault (47). Thus it is apparent that the present interpretation represents a confirmation of interpretations already advanced by some, and re-emphasis of points already noted by others.

As regards the relationship between our experimental findings and the data of previous investigators, we have pointed out from time to time the correspondence of our results with those from studies on prestige suggestion and the experimental modification of attitudes. One will recall here the work of Sherif (118, 121), Lorge (79), Cantril (27), Wegrocki (144), Hartmann (55, 56), etc. Again, if we may reinterpret somewhat the results of other investigators, it will be evident that our own findings follow similar lines. Experiments making use of perseveration, transferred conditioned response, association, etc., in eliciting suggestion, commonly include in their procedures a preliminary training or preparatory period. The "preparation" of the subject involves showing lines of actually increasing length, producing actual heat in the warmth-apparatus, actual motion of the toy camel, the release of actual odors to be smelled, etc. These procedures set up a determining tendency or set which probably acts in much the same fashion as do the "attitudes" of our own experiments; and in the absence of such preparatory set, it is difficult to evoke the suggestion-response.[85]

The chief difference between these techniques and our studies of attitude in suggestion lies in the fact that in the former experiments the set is pro-

85 *Cf.,* the footnote regarding Hull's postural sway technique (p. 11). Dr. Fredericksen's discovery that sway is not forthcoming in the absence of instructions to "Let yourself go" is revealing in this connection. F. V. Taylor's recent analysis of a "classroom demonstration of suggestion" (136) admirably illustrates the importance of establishing the appropriate preparatory set.

duced by specific training in the experimental situation itself, while the attitudes whose influence we studied are presumably the product of the life-long process of socialization of the individual.[86] The influence of the subject's own previous experience, in conditioning the acceptance of suggestion, is perhaps nowhere more nicely demonstrated than in the experiment of Langfeld (73), wherein the subjects, having built up specific "attitudes" or response-tendencies toward the pictures, then accepted suggestions which corresponded with these established attitudes and tended to reject suggestions which did not so correspond. The rôle of previously established attitudes, thus, is comparable in the usual suggestion-situation and in our own procedure.[87]

The significance of attitude in the acceptance of suggestion relates also to the problem of the *"trait" of suggestibility,* and to the association of such a trait with other personality traits. The bearing of our results upon these problems may be indicated by pointing out that they verify the anticipation expressed by Murphy and Murphy, that

"If it be true that suggestibility is a mere special case of association (facilitated by various attitudes)[88] we should scarcely be likely to find a general 'trait of suggestibility' differentiating one person from another" (93, *p. 157*).

The results of the mathematics experiment are reconcilable with the findings of a negative correlation between suggestibility and intelligence in terms of the common operations involved in arriving at the various results. Common elements appear in tests of suggestibility and of intelligence (Otis' suggestibility-test [97] had a correlation of .77 with the Stanford-Binet tests); common elements were also present in our mathematics test (of difficulty) and the test of suggestibility in mathematics; furthermore, problems involving mathematical knowledge frequently have a place in tests of intelligence. It is not surprising that "knowledge of mathematics" was found negatively associated with suggestibility in mathematics, to about the same extent that intelligence is found negatively associated with general suggestibility.

(2) The second general principle which emerges from our study concerns the place of *situational factors* in the process of suggestion. The evidence

[86] The influence of long training in classroom docility is also noteworthy as a contributing attitudinal factor in ideomotor experiments.

[87] *Cf.* also, our Rorschach experiment, in which specific Aufgaben were set up in the experimental situation. The similarity of these results to our other results argues for the comparability of the rôles of 'experimental' and 'social' attitudes.

[88] It should be noticed that the Murphys have in mind here a class of attitudes slightly different from those tapped in our study. They refer particularly to 'emotional relationships toward the experimenter.' If we may broaden the connotation of the term, their statement applies as well to the present findings.

points to a condition of *ambiguity* or *difficulty* as optimal for the production of general suggestibility. The various procedures employed might be subsumed under the concept of *"structuration"* of the situation. The Rorschach inkblots offer stimuli lacking in organization, meaningfulness or pattern. We have argued that tonal volume and orthosonority are less meaningful, less clear than is pitch. Similarly, difficult mathematical problems are unclear, relatively meaningless; they stimulate no ready response tendencies in the untutored subject. Such are the stimulus-characteristics which we would align under the term structuration. Responses to "unstructured" stimuli appear more accessible to influence by suggestion than do responses to relatively "structured" stimuli.

Existing theoretical formulations of the suggestion process (with the possible exception of Doob's presentation [39]) do not appear to have taken so much account of this condition of suggestion as perhaps they have of attitudinal conditions. Nor is there a sizeable body of research devoted to its clarification. In addition to the work of Sherif (119), however, a number of experiments contain results which we have elsewhere cited as exemplifying the increase in suggestibility contingent upon the use of relatively unstructured stimuli (*e.g.,* judgments of such facial expressions as do not, without suggestion, return majority agreement).

Moreover, though no attempts have been made toward systematic variation of stimulus-structuration, it may be noted that experimenters have implicitly recognized its importance, in their frequent selection of ambiguous materials for experiment in suggestion. The perception of slight temperature changes in metallic objects, of odors in a crowded classroom, or of movement of a dimly illuminated object; reproduction of a briefly exposed line or figure; judgments of complex musical, poetic or pictorial compositions: these commonly entail responses to stimuli which to most observers are ambiguous and often confusing. Thus the condition of lack of structuration has in many cases been an undefined contributing factor in the "success" of standard experiments in suggestion.[89]

We have presented, in this brief review, a summary statement of our own findings and an indication of their relationship to previous experimental and theoretical approaches to suggestion. The present results suggest the importance of two principal conditions, attitudinal and situational, of the suggestion process.

[89] The usage to which conditions of confusion and ambiguity are put by contemporary propagandists will be evident. Cultivating "lack of structuration" constitutes an important part of the procedure of preparing fertile soil for 'sowing of the seeds.'

The functioning of these factors in conditioning the acceptance of suggestion appears to be harmonious, and it is felt that the two principles are capable of combination into a single statement of relationships. If, in the interests of a unified terminology, we may employ the concept "structuration" as a generic term indicative of the configuration of external stimulus-factors ("external structuration") and of the pattern of internal attitudes and values of the individual ("internal structuration"),[90] it appears evident that the acceptance of suggestion is conditioned by the total "structuration" of the situation.

Suggestion is what Hartmann (142) would term a "framework response." Those suggestions will be accepted which, to use Hartmann's word, "fit" the framework. The "determining" features of the frame may be predominantly internal: individual attitudes or "frames of reference" may be the controlling elements. On the other hand, and particularly in the relative absence of such internal determinants, external features of the stimulus-situation itself may dominate in the response to suggestion. When the situation is "well-structured," in terms of either attitudinal or situational factors, those suggestions which accord with the existing structuration will tend to be accepted; those which conflict will tend to be rejected. When, for the individual, no clear structuration is perceived, either in terms of existing attitudes or by way of unambiguous stimulus-characteristics, and when some form of response is required of the subject, he will tend to be suggestible to the "propositions" presented by the experimenter. The experimenter, by his suggestions, thus provides for the subject the needed structuration.[91]

Such an interpretation of suggestion, though couched in different terms, would seem to be consonant with accepted theories. It represents one manner of describing, in a new form and with certain new emphases, processes similar to those embodied in explanations of historical accepta-

[90] Such a distinction between "external" and "internal" structuration does not necessarily imply that the two aspects may not ultimately be reducible to one. In this connection, also, it is worth noting Chapman and Volkmann's comment regarding the concept of structuration. They remark, "Sherif has used the terms 'structured and unstructured stimulus situations.' It seems to us, however, that structuredness applies not to stimulus situations but to the subjective frames of reference which they produce. Better is McGregor's term 'ambiguous and unambiguous stimulus situations.' In the present paper we use such adjectives as 'determinate' and 'indeterminate' to apply to frames of reference whose anchoring-points determine judgments with greater or less rigidity" (34, *p. 236*). It is with such considerations in mind that we have most frequently employed, in the present study, the terms "ambiguous" and "unambiguous" stimuli.

[91] Cantril (30), *e.g.*, has pointed out the rôle of the radio commentator in "helping people to give meaning to the scattered news items of the day . . . especially when meanings are needed for events far removed from the everyday life of the average listener." This is relied upon primarily "by people in the lower socio-economic bracket," for whom much of the news is "lacking in significance."

bility. In describing suggestion as an associational process facilitated by conditions of dissociation and inhibition, writers have reference to phenomena similar to those implied in the present approach. To adduce or infer a state of dissociation or inhibition is to describe a condition of lack of (effective) internal structuration capable of determining a "critical response." To refer to an absence of external structuration is in essence to carry the description of the process a step farther and to recognize the rôle of stimulus-control of behavior. Operations, in producing suggestibility, aimed at inducing dissociation and inhibition may also be described as operations calculated to reduce or eliminate internal attitudinal influences. Stimuli employed to demonstrate ideo-motor suggestibility, are also stimuli of unstructured character.

Hence, these principles of suggestion are presented, not as controverting existing interpretations, but as emphasizing conditions which have been recognized both explicitly and implicitly by numerous investigators and writers on the problem of suggestion. Some justification for the introduction of novel terms into the description of suggestion may be found in the emphasis they place upon what White (150) has called the "dynamic" aspect of the process, as opposed to an "aptitudinal" approach by way of inherited personality make-up or induced "states of mind."

In fine, we conceive of the principles advanced here as indicating certain "limiting conditions" within which the process of suggestion operates, much as other, perhaps more adequately understood psychological processes operate within the limits of prescribed internal and external conditions.[92] These limits, in the case of suggestion, would seem to be set by factors of external stimulus-structuration, and subjective frames of reference. Conditions are *optimal* when there is *"lack of structuration"* and *congruence of "propositions" with frames of reference.*

[92] McGregor indicates the rôle of ambiguity and desire as limiting conditions in the determination of predictions of social events. ". . . When the stimulus situation is unambiguous, wishful factors are of negligible significance. . . . The influence of subjective factors upon prediction is limited by the *degree of ambiguity* of the stimulus situation, but also this influence is dependent upon the *importance* for the predictor of the issues involved" (85, *pp. 203, 192*). This last statement describes a limiting condition, subjective "importance" (which we termed 'ego-involvement'), whose influence in suggestion was demonstrated in certain cases in our mathematics experiment (chapter V).

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APPENDIX

(1) SCALE FOR OCCUPATIONAL ATTITUDES

(2) MATHEMATICS TEST

In the following list are ten occupations which you are to arrange in the order of their social standing according to your judgment. After that occupation which you consider to have the highest social rating, on the basis of its contribution to society, place the number (1); after that which you think should occupy second place in this respect, the number (2); and so on until finally you place (10) after that occupation which you think deserves the lowest social rating.

Social Contribution

Banker (part owner, and director in bank) .....
Barber (works in barber shop) .....
Chauffeur (runs an automobile) .....
Ditch Digger (works with pick and shovel) .....
Factory Worker (runs machine in factory) .....
Lawyer (practises law in court) .....
Manufacturer (owner of a textile factory) .....
Mechanic (repairman working in a garage) .....
Physician (practises medicine) .....
Professor (teaches in college or university) .....

Finally, in which one of the above occupations would you:

(a) *most* desire to be engaged? .....
(b) *least* desire to be engaged? .....

Considering all possible occupations, what one *do* you plan to enter? .....
What is your father's occupation? .....

RICHARDSON NUMBER FACILITY TEST

How much Mathematics did you have in High School? .....
How much Mathematics did you have in College? .....
What is your Major subject? .....
Do you *like* Mathematics? .....
Are you "good at mathematics"? .....

In this Number Facility Test, please show on the paper *all* the work you do.

Do not do the work in your head and just write the answer. There is space provided with each problem in which to do all your figuring. And please do not erase work you have put down; cross it out, if you wish.

You will have only a short time for this test, so *work as rapidly as you possibly can!*

Do Not Turn the Page Until Directed to Do So

GROUP I.

I. An A. & P. fruit store charges 11¢ for three apples. How much do 24 apples cost?.....

II. Mary has a piece of ribbon ⅛ yard long and another piece ¼ yard long. Together the pieces are how many inches long?.....

III. If four pears cost 13¢, how much will two dozen cost?.....

IV. If the divisor is 16, the quotient 43 and the remainder 11, will the dividend be more or less than 2.1?.....

GROUP II.

I. The area of a square in front of a building is 144 square feet. What is the length?.....

II. Does five-eighths of 80 equal eight-fifths of 50?.....

III. A house that cost $8,575.00 was sold at a gain of 40%. What was received for it?.....

IV. Find the square root of 1800. .....

GROUP III.

I. A rectangular field of one hundred foot length encloses 2,500 square feet of ground. If stone walling costs $.95 per foot, will $2,400 be sufficient to wall the field?.....

II. Jack lives in Chambersville and his girl lives in Pottstown 2 miles away. The road goes over a hill, the first mile uphill, the second mile downhill. Jack's car can average only 30 miles an hour up the hill. How fast will he have to go down hill to average 60 miles an hour to his girl's house?.....

III. A surveyor lays out on the ground an equilateral triangle the area of which is 100 square feet. Will his 30-foot chain be long enough to stretch completely along one side?.....

IV. Multiply: $3x - 4y$
$2x - 7y$

Group IV.

I. The length of a rectangle is 2 greater than the side of a given square and the width is 2 less than a side of the same square. The diagonal of the rectangle is 20. If s represents one side of the square, find the value of s. .....

II. The length of a rectangle is three times the width. If the width is diminished by 1 inch and the length increased by 3 inches, the area will be 72 square inches. Find the dimensions of the original rectangle.....

III. Psychologists assert that the rectangle most pleasing to the eye is that in which the sum of the two dimensions is to the longer as the longer is to the shorter. If the area of a page is 25 square inches, what should its dimensions be?.....

IV. Cloth, when wetted, shrinks one-eighth in its length and one-sixteenth in its width. If the surface of a piece of cloth is diminished by $5\frac{3}{4}$ square yards and the perimeter by $4\frac{1}{4}$ yards, what was the length and width of the cloth originally? .....

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